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# Public opinion and public engagement with genetically modified foods : a qualitative study

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## ABSTRACT

An abstract of the thesis of Celeste Laurana Moser for the Master of Science in Communication presented May 7, 2010.

Title: Public Opinion and Public Engagement with Genetically Modified Foods: A Qualitative Study.

Existing literature suggests that many Americans are uninformed, disengaged, and have yet to form a crystallized opinion regarding genetically modified (GM) foods. However, some publics, such as the organic food community, are engaging in the GM debate. This community has a stake in the debate because it rejects the use of artificial fertilizers, synthetic chemicals, and genetically modified seeds in crop production.

The purpose of the current study was to understand public opinion formation by determining what factors influence opinion leaders in the organic food community to engage in the genetically modified food debate, and how opinion leaders describe American lay publics' engagement in the debate.

Seven opinion leaders from the Learning Garden Laboratory (based in Portland, Oregon) were selected to participate. In-depth interviews were conducted to develop an understanding of the participants' experiences with the GM debate and to better understand their perceptions of American lay publics' engagement in the debate.

The findings suggest that opinion leaders in the organic food community engage in the debate by seeking out new information about GM food issues, participate in discussions with others, and critically thinking about these issues, which is consistent with previous research addressing opinion leadership. The participants also described American lay publics as uninformed and disengaged in the GM debate. The participants recommended developing and implementing educational curricula (from elementary to college level) that accurately describe GM issues as a means for increasing American lay publics' understanding and engagement in the debate.

Public Opinion and Public Engagement with Genetically Modified  
Foods: A Qualitative Study

by

Celeste Laurana Moser

A thesis submitted in partial fulfillment of the  
requirements for the degree of

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in  
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## Table of Contents

Acknowledgements.....	i
Chapter 1	
Introduction.....	1
Chapter 2	
Literature Review.....	3
Chapter 3	
Background on Genetically Modified Food.....	21
Chapter 4	
The Organic Food Movement.....	40
Chapter 5	
Methods.....	43
Chapter 6	
Findings.....	62
Chapter 7	
Discussion and Conclusion.....	88
References.....	97
Appendices	
A. Human Subjects Approval.....	103
B. Interview Questions.....	104
C. Code Sheet.....	106
D. Excerpt of “Tony’s” Interview.....	108
E. Excerpt of “Jennifer’s” Interview.....	110
F. Excerpt of “Stephanie’s” Interview.....	112
G. Excerpt of “Kristin’s” Interview.....	114
H. Excerpt of “Ann’s” Interview.....	116
I. Excerpt of “Charlie’s” Interview.....	118
J. Excerpt of “Veronica’s” Interview.....	119

## **Introduction**

Genetically modified (GM) foods have been bought, sold, and consumed for over fifteen years with little resistance from American consumers (Hebden, Shin & Hallman, 2005). Existing public opinion polling data has led some researchers to conclude that public knowledge and understanding of the genetic modification of food is relatively low (Pew Initiative on Food and Biotechnology, 2006); and many Americans hold uncrystallized and malleable opinions about these foods (Hallman & Hebden, 2005).

In terms of forming opinions, researchers have found that Americans look to those closest to them, especially friends and loved ones, as trusted sources of information on genetically modified foods and biotechnology (Pew Initiative on Food and Biotechnology, 2006). Therefore, opinion leaders—individuals who disseminate information and model behaviors within their social networks—appear to be vital in public opinion formation regarding genetically modified foods.

To better understand public opinion formation, it is important to determine who is engaged in the genetically modified food debate, and one group who is engaging in the debate is the organic food community. The organic food community appears to be involved in the debate because it rejects the use of artificial fertilizers, synthetic chemicals, and genetically modified seeds in crop production (Lyons, Lockie & Lawrence, 2004), specifically because these practices would produce plants and animals of poorer health, which would in turn promote poorer health in humans (Reed, 2002).



It appears that the organic food community has taken a stand against genetically modified foods, and is engaged in the debate because the community is actively resisting GM technology. Therefore, the organic food community provides a unique vehicle for exploring public opinion formation, regarding genetically modified foods. In addition, it seems likely that opinion leaders from this community might be able to explain (a) why GM issues are important to the organic food community, (b) why they are personally engaging in the debate, (c) and, perhaps, provide some insights as to why the majority of American publics are ambivalent and uninformed about genetically modified foods.

Therefore, the purpose of this study is understand public opinion formation by determining what factors influence opinion leaders in the organic food community to engage in the genetically modified food debate, and how opinion leaders describe American lay publics' engagement in the debate. Specifically, this study will explore public opinion formation and opinion leadership through the lens of W. Phillip Davison's Communication and Opinion Leadership Model and Everett Roger's Diffusions of Innovations Model.

## **Chapter 2: Literature Review**

The literature that guided this study is drawn from the theories and research pertaining to opinion formation and opinion leadership. Specifically, two theoretical models (Communication and Opinion Leadership Model and the Diffusion of Innovations Model) were selected to explain public opinion formation, the use of mass media and interpersonal communication in opinion formation, and the role of opinion leaders in opinion formation. The Communication and Opinion Leadership Model is useful in explaining the macro or broad process of opinion formation within a community, whereas the Diffusion of Innovations Model addresses the importance of interpersonal relationships and how new ideas are passed between individuals. These two models examine opinion formation from different perspectives (community level and the individual level); however, both models highlight the importance of opinion leaders in the opinion formation process.

This analysis of literature will start with an examination and explication of opinion leadership, which will be followed by an overview of the Communication and Opinion Leadership Model, and finally I will provide an overview of the Diffusion of Innovations Model. Then I conclude the chapter by summarizing and synthesizing the two models.

### **Opinion Leadership**

In the 1944 book, *The People's Choice*, authors Paul Lazarsfeld, Bernard Berelson, and Hazel Gaudet evaluated the process of decision-making during the

course of an election campaign, which provided the original conceptualization of opinion leadership. Lazarsfeld et al. (1944) found that “ideas often flow from radio and print to opinion leaders and from these to the less active sections of the population” (p. 151). Lazarsfeld et al. suggested that information from mass media first reached opinion leaders, who, in turn, passed on what they read or heard to their every-day associates for whom they are influential. This hypothesis is known as “The Two-Step Flow of Communication,” which is thought of as networks of interconnected individuals through which mass communications are channeled (Katz, 1957).

The design of the Two-Step Flow of Communication hypothesis was later criticized because it did not account for the importance of interpersonal relations (Katz, 1957), and it was a gross oversimplification of the process of communication (Rogers, 2003). However, Lazarsfeld’s concept of opinion leadership has much theoretical and practical utility (Rogers, 2003).

Lazarsfeld and colleagues (1944) identified certain individuals who paid close attention to an issue, frequently discussed an issue, and considered themselves persuasive in convincing others to adopt an opinion or course of action as opinion leaders. Opinion leaders were defined by Lazarsfeld et al. (1944) as “people who are most concerned about the issue as well as the most articulate about it” (p. 49). Similarly, Katz (1957) characterized opinion leaders as individuals who have an intense involvement with a specific issue or topic, greater levels of media attention, and issue-specific knowledge. Weiman (1991) expanded this definition by classifying

opinion leaders as having a higher level of interest, knowledge, and social recognition about a specific issue than non-leaders. In addition, Katz and Lazarsfeld (1955) found that opinion leaders tend to be more exposed to mass media than non-leaders, and opinion leaders are more exposed to information associated with their area of interest or leadership than non-leaders.

Opinion leaders do not necessarily hold formal positions of power or prestige in communities, but rather serve as communication providers who alert their peers to important issues around political events, social issues, and consumer choices (Nisbet & Kotcher, 2009). In other words, opinion leaders can serve as role models for opinion formation and behavior change within their community (Valente & Pumpuang, 2007). Opinion leaders, in the classical sense, are very much like the people they influence, and both influencer and influencee typically belong to the same primary groups of family, friends, and coworkers (Katz, 1957). In addition, opinion leaders and influencees may exchange roles in different spheres of influence (Katz, 1957). For example, Sally is very interested in organic gardening and often discusses gardening with her sister, Jane. Jane recently decided to plant a garden in her backyard, so she went to Sally to find out what she needed to do to get started. Jane, on the other hand, regularly practices yoga and she encouraged Sally to take a yoga class with her. Therefore, both Sally and Jane are opinion leaders in different spheres of influence.

Opinion leaders are distributed in all occupation groups, and on every social and economic level (Katz & Lazarsfeld, 1955). "Opinion leadership is not a trait that some people have and others do not, but rather that opinion leadership is an integral

part of the give-and-take of everyday personal relationships” ( p. 33). In other words, all interpersonal relationships are potential networks of communication, where opinion leaders play a key role.

The concept of opinion leadership has primarily been studied in local forms of community and social interaction where face-to-face communication has taken precedence (Nisbet & Kotcher, 2009). However, today’s networked society (for example, Internet, email, instant messaging, blogs, online chats, etc.) has opened up new channels for people to receive and exchange information. Shah and Scheufele (2006) argued that the growth of the Internet as a mass medium has provided opinion leaders with another tool to learn about issues of interest and discuss these issues with others. More specifically, Shah and Scheufele claimed that the use of the Internet can allow opinion leaders to gather information that can enhance their potential influence. For example, individuals can search for information across a range of varying topics, have online discussions with other interested individuals, and locate additional information and resources on specific topics of interest. In a 2001 study, Shah, Kawak, and Holbert found that individuals who use the Internet to explore interests, gather news, and exchange ideas were more socially and politically engaged. A related study found that online media complemented traditional media and fostered discussions because the Internet served as both a source of information and a sphere of active communication (Shah, Cho, Eveland & Kwak, 2005). Shah, Kwak, and Holbert (2001) predicted that the Internet will gain influence, relative to other media forms, as it continues to develop and expand.

The Internet appears to be a useful tool for opinion leaders to acquire information and engage in discussions with others. However, recent studies have shown that face-to-face recommendations are still preferred by Americans over digital sources of information (Carl, 2006; Xue & Phelps, 2004). Therefore, in today's networked society the Internet is a useful tool to share information and connect with others, but society still places value on interpersonal relationships and face-to-face communication.

Considerable research attention has been directed at the characteristics of opinion leaders, and how opinion leaders communicate and influence others. However, much less effort has been aimed at identifying the motives that foster opinion leadership (Richins & Root-Shaffer, 1988). Consumer researchers appear to be most interested in why opinion leaders communicate with others. Dichter (1966) suggested that product involvement—experience with a product that results in talk, recommendations, and excitement—was an important determinant of opinion leadership and word-of-mouth communication. Feick and Price (1987) suggested that opinion leaders are motivated to talk to others about a specific product because they are involved with it. However, Bloch and Richins (1983) suggested that opinion leaders' product involvement might be situational and may not be long term or enduring. Richins and Root-Shaffer (1988) found that enduring involvement does result in opinion leadership and "situational [or temporary] involvement bears no relationship at all with opinion leadership" (p. 34). Moreover, Richins and Root-Shaffer (1988) found that consumers highly involved in a product engaged in

conversation with others of “like mind.” Engagement tended to be mutual, two-way conversations where both people involved were giving information, receiving information, and comparing opinions. In other words, opinion leadership occurs when an individual is highly involved or excited about a product, and opinion leaders seek out discussions with people of whom they are similar.

In summary, opinion leaders are individuals who pay close attention to an issue, seek out information on a topic, and have discussions with others about the issue. In addition, opinion leaders are present in all groups and can serve as role models for behavior change and opinion formation (Valente & Pumpuang, 2007), which is an important part of the give-and-take of everyday personal relationships (Katz & Lazarsfeld, 1955, p. 33).

Now, I will move on to examine the Communication and Opinion Leadership Model, where opinion leaders play an important role in opinion formation. This model focuses on the entire process of public opinion and how opinion is formed in communities of people.

### **Communication and Opinion Leadership Model**

The study of the public opinion process in social science primarily includes psychological (attitudes and beliefs), social (group discussion and norms), and political (elite perspectives presented in the media) components (Hoffman, Glynn, Huge, Sietman & Thomson, 2007). However, public opinion researchers often focus on only one level of the process at a single point in time (Hoffman, Glynn, Huge,

Sietman & Thomson, 2007). W. Phillip Davison's Communication and Opinion Leadership Model (1958) is somewhat unique because it looks at the entire process of public opinion formation.

Davison used the analogy of scattered seeds to represent public opinion. Seeds numbered in the thousands are scattered over all stretches of land. Some seeds fall on rocks and cannot take root; while others die due to lack of soil or are smothered by weeds. Only a few seeds fall on the earth where the conditions are ideal and they take root and continue to grow (Davison, 1958). Just like many of the scattered seeds, there are several public issues that never take root. Davison claimed that an issue only begins to take root "when it is communicated from one person to a second, who then carries it further in his/her conversations. Most potential issues disappear from attention before this human chain grows to an appreciable length, but the few that survive form the basis for public opinions" (p. 93). According to Davison, an issue develops momentum when an idea is communicated from one person to the next, and only widely discussed issues develop into public issues (Hoffman, Glynn, Huges, Sietman & Thomson, 2007). In Davison's model, public opinion is referred to as "action or readiness for action with regard to a given issue on the part of members of a public who are reacting in the expectation that others in the public are similarly oriented toward the same issue" (p. 93).

An issue germinates when it is spread to more human groupings (Davison, 1958). For example, if Tom is having a discussion with Steve about genetically modified foods, and from this conversation Tom has more discussions about



genetically modified foods with his circle of friends, family, and coworkers, the issue has spread to more human groupings. At this stage of the process, opinion groups and leaders emerge. Opinion leaders—people who influence the opinions, beliefs, motivations, and behavior of others (Valente & Pumpuang, 2007)—tend to have the means for organization and mass publicity (Davison, 1958). An opinion leader's influence begins to extend beyond primary circles (Glynn, Herbst, O'Keefe, Shapiro & Lindeman, 2004), where simplification and generalization of the original ideas usually occur (Davison, 1958).

The next stage of the public opinion process is inter-group communications, where it becomes crucial for primary groups—a group of individuals who converse together about an issue—to transmit facts and opinions to reach the wider society (Glynn, Herbst, O'Keefe, Shapiro & Lindeman, 2004). Mass communications (such as radio, television, newspapers, etc.) are effective because these mediums have the ability to reach large numbers of people simultaneously (Davison, 1958). However, information can also be transmitted through person-to-person communication systems. This process is slower than mass communications, but it is also effective at disseminating information to the public. If substantial numbers of individuals accept or reject the ideas being communicated there is a chance public opinion will develop (Davison, 1958). At this point a circular process ensues when an increasing volume of public communications stimulates more group discussions and involvement of new groups which leads to more public communication (Davison, 1958). For example, if an organic farmer was picketing a supermarket for selling genetically modified foods,

and if his protest was covered on the nightly news, and this news coverage sparked more discussions about genetically modified foods, this would result in a media-discussion circular process.

At this point in the process the issue has been communicated to wider publics. As individuals think about issues and form attitudes, the influences of others can come into play (Davison, 1958). Individuals begin to develop expectations about what others' opinions are. "These expectations may develop as a result of individuals 'sampling' group opinions, from social projection of one's own opinions onto others or from individuals' believing that they 'know' how members of a group are likely to respond to an issue" (Glynn, Herbst, O'Keefe, Shapiro & Lindeman, 2004, p. 243). Individuals determine their own opinions based on information, observation, sampling, and the opinions of salient others (Davison, 1958). "A process is set up in which expectations produce behavioral adjustments, and these in turn reinforce expectations. When this has happened public opinion has been formed" (p. 101). Behavioral adjustments can include changing one's habits or routines, or adjusting one's attitude or opinion on an issue. For example, if Sue learns about genetically modified foods from the mass media and then discusses this topic with her social circle and forms the opinion that she wants to avoid consuming genetically modified foods, her opinion will be solidified once she changes her behavior to reflect her opinion (e.g. buying organic foods, avoiding processed food that contain genetically modified components).

In summary, Davison's Communication and Opinion Leadership Model highlights the importance of social networks, opinion leaders, in-depth discussion, and media coverage of an issue. In Davison's view public opinion is not formed or solidified until the community as a whole is aware of an issue, aware of the main arguments surrounding the issue, and individuals make behavioral adjustments based on their understanding of the issue. Davison's model is being used by contemporary scholars to test and explain the multiple factors associated with the process of public opinion. For example, a 2007 examined the various components of the public opinion process and used Davison's model to frame their study (Hoffman, Glynn, Huge, Border Sietman & Thomson, 2007).

In many ways opinion formation is social. Joan Black (1982) suggested that "when faced with an unclear situation which requires some reaction, people turn to friends and relatives to define the situation in terms that permit them to act" (p. 170), which is the basic underpinnings for the diffusion of new ideas. I now turn to the diffusion model, which addresses the flow of new ideas on an individual (or micro) level.

### **Diffusion Model**

Closely related to the research on opinion leadership is the sizable literature on the diffusion of innovations (Rogers, 2003). This research focuses on the nature and role of early adopters in the spread of ideas, products, and technology. The revolutionary paradigm for diffusion research stems from Bryce Ryan and Neal Gross'

1943 work on the diffusion of hybrid corn seed among Iowa farmers. Ryan and Gross gathered personal interviews from Iowa farmers in two communities. The researchers found that the typical farmer first heard about hybrid seeds from salesmen, but neighbors were most commonly cited as influential in their adoption of hybrid seed (Rogers, 2003). “The farmer-to-farmer exchanges of their personal experiences with hybrid seed were at the heart of diffusion...the farm community as a social system, including the networks linking the individual farmers within it, was a crucial element in the diffusion process” (Rogers, 2003, p. 34).

Ryan and Gross’ (1943) examination of diffusion and the two-step flow of communication—a process of information moving from the mass media to opinion leaders, and influence moving from opinion leaders to their social circle—became the guiding models for diffusion research (Rogers, 2003). “Diffusion is the process in which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2003, p. 5). Diffusion is a special type of communication that is used in the spread of messages that are perceived as new ideas, which can present some amount of uncertainty to a people (Rogers, 2003). The five main elements of the diffusion of new ideas are: innovation, communication channels, time, and the social system.

An *innovation* is an idea, practice, or object that is perceived as new by an individual (Rogers, 2003). The characteristics of an innovation, as perceived by individuals, determine the rate of adoption (Rogers, 2003). These characteristics are: relative advantage, compatibility, complexity, trialability, and observability.

Relative advantage is the degree to which an innovation is perceived as better than the idea that supersedes it (Rogers, 2003). “The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be” (Rogers, 2003, p. 15). Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 2003). Complexity is the degree to which an innovation is perceived as difficult to understand or use (Rogers, 2003). Trialability is the degree to which an innovation can be experimented with on a limited basis (Rogers, 2003). Finally, the last characteristic of innovation is observability, which is the level that an innovation is visible to others (Rogers, 20003). “Innovations that are perceived by individuals as having greater relative advantage, compatibility, trialability, and observability and less complexity will be adopted more rapidly” (Rogers, 2003, p. 16).

Rogers (2003) defined communication as “the process by which participants create and share information with one another in order to reach a mutual understanding” (p. 18). Recall that diffusion is a particular type of communication that is used to spread information pertaining to new ideas. The basic process of diffusion involves an innovation that an individual has knowledge of, or experience using the innovation, which is communicated to another individual who does not yet have knowledge of or experience with the innovation. For example, Jim learns about genetically modified foods and shares this information with his brother, Tim, who prior to their conversation, had not yet heard about genetically modified foods.

A *communication channel*, “is the means by which messages get from one individual to another” (Rogers, 2003, p. 18). The two communication channels utilized in diffusion are mass media channels and interpersonal channels, in which both channels serve different functions. Mass media channels (such as television, radio, Internet, newspaper, etc.) are usually the most rapid and efficient way to *inform* potential adopters of an innovation because one message can reach numerous individuals. Interpersonal channels (face-to-face exchanges between two or more individuals), on the other hand, are more effective in informing individuals to accept or reject new ideas. Rogers (2003) argued that most individuals evaluate an innovation, not on the basis of scientific research by experts, but rather based on information received from their peers who have already adopted or rejected the innovation.

*Time* is the third element of the diffusion process, which addresses the mental process that an individual goes through. Rogers (2003) identified five stages of the innovation-decision process. First, the individual learns about the innovation. Second, the individual starts to form an attitude towards the innovation. Third, the individual makes a decision to adopt or reject the innovation. Fourth, the individual implements the innovation into his or her life and puts the innovation into use. Finally, an individual seeks confirmation of this decision. However, this decision might be reversed if the individual is exposed to conflicting messages about the innovation. For example, Curt started using a new fertilizer on his vegetable garden, but after talking

to his neighbor he found out that the fertilizer could make his dog sick, so he stopped using it.

The process of evaluation happens at different rates for different people. Some people are quick to adopt or reject an innovation, whereas others process the information for longer periods of time before they make the decision to adopt or reject an innovation (Rogers, 2003).

The final element of diffusion is the *social system*, which Rogers (2003) defined as, “a set of interrelated units that are engaged in joint problem solving to accomplish a common goal” (p. 23). Diffusion occurs within social systems, and opinion leaders are vital to the diffusion process because they provide information and advice to others within the system (Rogers, 2003). Recall that opinion leaders are people who influence the opinions, beliefs, motivations, and behavior of others (Valente & Pumpuang, 2007). Rogers (2003) suggested that when opinion leaders were compared with their followers, they are more exposed to all forms of external communications, have somewhat higher socioeconomic status, and are more innovative than non-leaders. In addition, Rogers (2003) noted that an opinion leader’s interpersonal networks allow the leader to serve as a social model whose behavior can be imitated by many members of the social system. For example, in a 2004 study, Stephen G. Sapp and Peter Korsching examined consumers’ adoption of food irradiation—a process that exposes food to gamma rays emitted either from a radioactive source or high-intensity X-rays (Sapp & Korsching, 2004). The researchers found that even when participants were presented strong endorsements

supporting the irradiation of food from trusted health-related organizations and agencies, statements from opinion leaders who opposed the irradiation of food significantly decreased consumer acceptance of the technology.

## **Summary and Synthesis**

In summary, the Diffusion of Innovations Model and the Communication and Opinion Leadership Model both suggest that opinion leaders acquire information and engage in discussions about specific topics within their social networks, which can increase public awareness and aid in opinion formation and the adoption of innovations. These models are useful tools in understanding the entire process of opinion formation, from both the community and individual levels.

The Communication and Opinion Leadership Model examines the entire process of public opinion formation. The model suggests that public opinion is not formed until an issue has been widely discussed. Therefore, this model is evaluating larger publics, and not individuals. However, individuals and their networks play an important role. Opinion leaders are a vital component in opinion formation where leaders model behaviors and share information with their circle of family, friends, and coworkers. The other vital component is mass media communications. These mediums are effective because messages can reach a large number of people simultaneously, and mass communications can create a circular process that can introduce people to new issues, which can lead to more discussions which can lead to more mass communications. In Davison's view public opinion is not the result of one individual's



opinion; rather it is the reflection of larger publics' opinion. Furthermore, public opinion is not formed until an issue has been widely discussed and the community as a whole is aware of the issues and has made behavioral adjustments to reflect their opinions.

The Diffusion of Innovations Model is rooted in interpersonal communication. The diffusion model suggests that individuals exchange information about new innovations and decide whether to adopt or reject them. The decision to adopt or reject an innovation is commonly made based on recommendations from peers and opinion leaders. Rogers (2003) argued that most individuals evaluate an innovation based on information received from their peers who already adopted or rejected an innovation. Diffusion does occur through social systems of interconnected individuals. Social systems foster opinion leaders who can provide information about an innovation and model behaviors for their followers. Therefore, information pertaining to new innovations can travel through a social system, but the spread of information is mostly dependent on interpersonal discussions.

The Communication and Opinion Leadership Model focuses on publics and communities, whereas the Diffusion of Innovations Model evaluated interpersonal discussions and individuals. The diffusion model explains how information travels between individuals and eventually through social systems, which is useful in understanding the Communication and Opinion Leadership Model approach to public opinion formation. It is important to understand the how public opinion develops in

communities as well as how information travels between individuals. It is necessary to explore both models to have a complete view of opinion formation.

The models address opinion formation from different views. However, both models recognize the importance of opinion leaders in opinion formation. To recap, opinion leaders aid in disseminating information and modeling behaviors. In addition, opinion leaders are similar to the people they influence (Katz, 1957), and leaders are distributed throughout every social and economic level (Katz & Lazarsfeld, 1955). Finally, opinion leaders tend to have high levels of interest in a specific issue or topic, greater levels of media attention and issue-specific knowledge, and have discussions with others about issues (Katz, 1948). In addition opinion leaders have higher levels of interest, knowledge, and social recognition about a specific issue than non-leaders (Weiman, 1991).

Much of the opinion formation and opinion leadership theories were developed in the 1940's and the 1950's, and since that time there have been advances in how people communicate and obtain information. The Internet has impacted how people find information, communicate, and connect with others. However, the Communication and Opinion Leadership Model and the Diffusion of Innovations Model have stood the test of time and are adaptable to these new modes of communication. Specifically, some researchers are interested in how the Internet affects opinion leadership and opinion formation (Shah, Kwak & Holber, 2001; Shah, Cho, Eveland & Kwak, 2005; Shah & Scheufele, 2006), and these researchers have found that the Internet serves as both a source of information and a sphere of active

communication that enhances opinion leadership. Therefore, it appears that the theoretical application of opinion leadership and opinion formation is still relevant even with the passing of time and the advent of new technology.

Similarly, the Diffusion of Innovations Model took root in 1943 with Ryan and Gross' work addressing the diffusion of hybrid corn seed among Iowa farmers. The current study, which took place sixty-six years after Ryan and Gross' groundbreaking work, also attempted to understand the diffusion of a food innovation. It appears that researchers are interested in how and why people adopt or reject food innovations. Therefore, opinion formation and opinion leadership theories seem to be one vehicle used to explore food related issues and opinion formation.

### **Chapter 3: Background on Genetically Modified Food**

The case of genetically modified (GM) foods provides a unique avenue to explore opinion formation because it is a controversial topic which has generated much debate around the world. For example, the Pew Global Attitudes Project found that in 2002 there was broad opposition to GM foods around the globe. Researchers found that Western Europeans (Great Britain 63%, Italy 74%, Germany 81%, and France 89%) and Japanese (76%) were overwhelmingly opposed to genetically modified foods, where respondents cited environmental and health concerns. However, opposition in the United States was less widespread, with 55% of Americans holding a negative opinion of GM foods (Pew Global Attitudes Project, 2002).

In addition, researchers have found that Americans hold uncrystallized and malleable opinions about GM foods (Hallman & Hebden, 2005). This malleability in opinion regarding such foods in the American populace makes the topic useful in the examination of opinion formation because it appears that many Americans have yet to form a solidified opinion about GM foods. Researchers have also noted that Americans' attitudes towards genetic modification are fluid, meaning that the opportunity to shape public opinion is ripe (Pew Initiative on Food and Biotechnology, 2006).

In this chapter I will provide an overview of the controversy surrounding genetically modified foods. Second, I will examine their global impact. Third, I will cover American views and opinions about genetically modified foods. Finally, I

conclude this chapter with an exemplar of American opinion formation regarding a genetically modified hormone (rBST) that was injected into cows to increase milk production.

## **Genetically Modified Food Controversy and Debate**

Genetically modified seeds are a fairly new advent in gene splicing where DNA fragments from one organism are inserted into the chromosomes of another, thus changing the genetic makeup of the seed, which is also known as genetic recombination (Shrader-Frechette, 2005). Through this gene transfer process scientists can take advantage of desirable traits from plants and animals to assist in making the GM seeds resistant to disease, drought, insects, and herbicides (Hallman, Hebden, Cuite, Aquino & Lang, 2004).

Controversy swirls around genetic modification technology, and the public debate seems to be polarized. For example, supporters believe that the technology can increase crop yields and production (Monsanto, 2009), increase the nutritional value of food (Schiermeier, 2001), and can be the key to feeding the growing world population (Zurek, 2007). Opposition to genetic modification technology arises out of concerns about inadequate testing of genetically modified seeds, the risk genetically modified seeds pose to human health, environmental threats, the impact of genetically modified seeds on long term global food and economic sustainability (Shrader-Frechette, 2005). In addition, there has been much debate about who owns the rights to this technology and what it means to own food.

It is important to note that when I make reference to the “genetically modified food debate,” I am referring to general discussions in a variety of forms, meaning that I refer to “debate” in a broad and all-encompassing way where the main focus is on discussions (Cook, Robbins & Pieri, 2006).

### **GM Intellectual Property Rights and Patents**

Patents—exclusive rights granted by a government to an inventor to manufacture, use, or sell an invention for a specified time frame—were originally intended to protect new inventions from being reproduced, sold, or distributed without permission. During 1985 the practice of patenting was forever changed when the United States granted Kenneth Hilbberd, a molecular genetics scientist, and his co-inventors, the patents on the tissue culture, seed, and whole plant of a corn species (Shiva, 1997), which was the first patent ever issued for a plant.

Since 1985 the patenting of genetically modified seeds has become a common practice for transnational biotechnology corporations. Biotechnology corporations spend millions of dollars in the research and design of genetically modified seeds. For example, in 2006, Monsanto, a world leader in genetic modification technology, invested over 750 million dollars in plant biotechnology (Monsanto, 2009). Therefore, it becomes important for biotechnology corporations to protect their investment with patents. Biotechnology industry leaders contend that the royalties they receive from their patented seeds are fair compensation for the biotech-engineering expenses

(Shrader-Frechette, 2005). The fee for genetically modified seeds can cost farmers up to four times more than the fee for a non-genetically engineered seed (Cooley, 2002).

Some researchers question the purpose of genetically modified seed patents and genetic modification technology. Vandana Shiva (1997), an environmental activist and physicist, argued that genetically modified seed patents are an instrument of market control. Madeley (2001) argued that biotechnology corporations' primary goals are to enrich their shareholders, which results in monopolist control over plants and seeds.

The most controversial advancement in genetic modification is what biologists call gene use restriction technology (GURT), but it is better known as the "terminator" gene. These seeds are designed to produce through one season, and are modified to become sterile during the second generation, which requires farmers to buy seeds every season. This type of technology would be devastating for farmers who have traditionally saved their seeds and sowed them the following season (Madeley, 2001). Shiva (2000) questioned the GURT technology and the effects on plant and human populations. More specifically, Shiva was concerned that GURT seeds could adapt and spread to surrounding food crops and the natural environment, causing naturally reoccurring seeds to become sterile. "The gradual spread of sterility in seeding plants would result in a global catastrophe that could eventually wipe out higher life forms, including humans, from the planet" (p. 83).

The terminator gene was developed by Melvin Oliver, a USDA molecular biologist and the primary inventor of GURT technology. Oliver felt that it was

necessary to come up with a system that allowed genetically modified seed producers to protect their investment in genetic modification technology. Oliver argued, “My main interest is the protection of American technology. Our mission is to protect U.S. agriculture, and to make us competitive in the face of foreign competition. Without this, there is no way of protecting the technology [GURT]” (Rural Advancement Foundation International, 1998, p. 2).

In summary, the debate around genetically modified food seems to be polarized, where supporters believe that genetically modified seeds can increase crop yields and ultimately feed the growing global population. However, opposition for genetic modification technology arises out of concerns about proper testing, the environmental impact, and the financial costs of genetically modified seeds.

### **Global Issues Surrounding Genetically Modified Foods**

With globalization and international trade in full swing, the issues surrounding genetically modified foods and seed patenting have affected the agricultural sectors of many countries. Beyond the agricultural impacts, the issues surrounding genetically modified foods have also affected the cultural and political realms of many countries. I will briefly cover the global genetically modified food issues that have garnered the most attention, which includes: rising suicide rates amongst Indian farmers, refusal of U.S. food aid by certain African countries, and the European Union’s decision to require the labeling of food containing genetically modified components.



In 1994, India agreed to liberalize agriculture trade under the Agreement on Agriculture (Weasel, 2009). The Indian trade liberalization emphasized agricultural growth through export-oriented farming, which was intended to increase revenue for farmers (Vakulabharanam, 2005). Another policy change came in 1998 when the World's Bank structural adjustment allowed biotechnology corporations, such as Monsanto, Syngenta, and Cargill, to enter India's seed sector (Shiva, 2004).

Prior to the trade liberalization, Indian farmers traditionally saved a portion of their seeds to replant in the following season. However, the traditional practice of seed saving could no longer occur with genetically modified seeds because these seeds were engineered with non-renewable traits (Shiva, 2004).

Shifting to genetically modified seeds was an expensive undertaking for Indian farmers for many reasons. First, genetically modified seeds were more expensive than non-genetically modified seeds. Second, Indian farmers needed to purchase genetically modified seeds every year, rather than sow reaped seeds. Third, many genetically modified seeds required the use of pesticides and fertilizers (Shiva, 2004).

Researchers suggest that trade liberalization policies, the introduction of genetically modified seeds, high costs of fertilizers and pesticides, poor growing conditions, and declining world crop prices drove many Indian farmers into severe debt (Madeley, 2001; Shiva, 2009). Some researchers have suggested that this indebtedness on the part of Indian farmers has resulted in 200,000 suicides since 1997 (Shiva, 2009). Vandana Shiva, who is a physicist, environmentalist, feminist, writer, and policy advocate, explained that:

Corporate seeds are creating a deep crisis for farmers because of high costs of seeds, high dependence on costly inputs [pesticides and fertilizers] and high levels of unreliability and crop failure...As production becomes more costly, and agricultural prices fall, indebtedness and economic displacement become the fate of the peasantry, played out in its most tragic expression through farmers' suicides (2004, p. 721).

Controversy surrounding genetically modified foods also hit the global stage in 2002 when the southern African countries of Zambia, Zimbabwe, and Mozambique initially refused thousands of tons of food aid, the bulk of which included genetically modified corn from the United States. Zimbabwe and Mozambique eventually accepted the food aid, but Zambia refused it (Weasel, 2009). This decision was based on recommendations from Zambian scientists and economists, who suggested that the U.S. food aid should be refused on precautionary principles because the studies on health risks of genetically modified foods were inconclusive (Bohannon, 2002). Zambia's President Levy Mwanawasa proclaimed "such food aid to be 'poison' that he would rather die than consume" (Weasel, 2009, p. 83).

One of the main arguments for rejecting the U.S. food aid was the fear that genetically modified corn kernels would contaminate the country's own non-genetically modified seed stock (Weasel, 2009). For example, in Zambia, like India, many farmers save a portion of their seeds for use in the following season. If the genetically modified corn was saved and planted by Zambian farmers it potentially

could have contaminated family farms, commercial fields, and the national seed company's stock of non-genetically modified seeds. Lovemore Simwanda, Zambia's National Farmer's Union Representative, explained that the contamination of the country's seed stock could have greatly impact market opportunities for export to Europe (Weasel, 2009).

Food trade with Europe has become more complicated in recent years because many Europeans have demonstrated strong opinions about genetically modified foods (Thomson & Dininni, 2005). Researchers have found that many Europeans believed that GM foods were risky, not useful, and should not be encouraged (Gaskell, Einsiedel, Priest, Ten Eyck, Allum & Torgersen, 2001). The Pew Initiative on Food and Biotechnology noted that:

European attitudes toward GM crops and food have been shaped by a variety of factors, including the experience of a major food safety crisis (mad cow disease), the lack of confidence in food regulators, different cultural attitudes toward food and farms, widespread media coverage of the issue, and activism by politically influential environmental, consumer and anti-globalization groups (2005, p.6).

The European government responded to public opposition to genetically modified food by requiring genetically modified food products to be labeled. In 2004 the European Union put into effect a labeling law that requires any food product

containing more than 0.9% genetically modified material to be labeled, which includes food for human and animal consumption (Hallman & Aquino, 2005).

In summary, genetically modified foods have had a global impact that has affected traditional farming practices, economic stability, and labeling laws. It is important to note that the global examination of genetically modified foods is not central to this analysis, and my coverage of these issues has been brief. The current study is more focused on American opinion formation regarding genetically modified foods. However, a review of genetically modified food history would be incomplete without some discussion of the global impact of genetically modified foods.

Now, I will explore American public opinion and knowledge of genetically modified foods.

### **American Public Opinion and Knowledge of Genetically Modified Foods**

Genetically modified foods hit store shelves in 1994 when the Flavr Savr tomato received U.S. Food and Drug Administration approval, and it has become a permanent staple in the American diet (McInerney, Bird & Nucci, 2004). Researchers estimate that 70 to 85 percent of the processed foods in the U.S. market contain at least a small quantity of genetically modified crops (Harlander, 2002).

Recent opinion studies suggest that Americans tend to be somewhat uninformed about genetically modified foods. A 2004 study conducted by Rutgers University recorded American opinions regarding genetically modified foods and found that less than half of the people polled (48%) realized that genetically modified

foods are currently available in supermarkets, while even less (31%) believed that they had personally consumed genetically modified foods. These opinions were further confirmed by a 2006 study conducted by the Pew Charitable Trusts, where researchers found that 60% of Americans believed that they have never eaten GM foods. In addition, only 38% of respondents said they would be likely to eat GM food given the choice, whereas 54% said they would be unlikely to do so (Pew Initiative on Food and Biotechnology, 2006). Recall that it was estimated that 70 to 85 percent of the processed foods in the U.S. market contains at least a small quantity of some crop that has been genetically modified (Harlander, 2002). Therefore, the data suggest that many Americans have been eating genetically modified foods without realizing it.

Many Americans appear to be unfamiliar with genetically modified foods, even though they are likely consuming food with genetically modified components. Some researchers have suggested that Americans are disconnected from their food because many are physically and psychologically isolated from farms and farming land (Hebden, Shin & Hallman, 2005). In addition, genetically modified foods are not labeled, which is another factor affecting American publics' understanding of genetically modified foods. Hallman and Aquino (2005) explained "that without GM labels, it is unlikely that American consumers will become much more aware" (p. 221). Currently, the Food and Drug Administration (FDA) requires special labeling if the composition of food developed through genetic modification differs significantly from its conventional counterpart (Food and Drug Administration, 1992), and since the FDA declared in 1993 that genetically engineered foods are "not inherently

dangerous” and do not require special regulation, therefore, no genetically modified food product labeling is required. However, the Rutgers’ study regarding Americans’ opinions about genetically modified foods found that 89% of the people polled believed that genetically modified food should be labeled (Hallman et al., 2004).

Some researchers have suggested that mass media are responsible for lack of understanding about genetically modified foods and GM technology among American lay publics. The Pew Foundation found that public knowledge of genetically modified food tends to be driven mostly by the degree to which the issue is covered in the media (Pew Initiative on Food and Biotechnology, 2005). In other words, when media coverage of genetically modified foods is limited, the public’s understanding of genetically modified foods is also limited. When Americans were asked in 2003 if they could recall any news stories or events related to genetically modified foods, only 19% of respondents said yes, and less than 1% remembered specific details about a news story related to the topic (Hallman et al., 2004).

Joan Thomson and Laura Dininni (2005) analyzed U.S. print media coverage of agricultural biotechnology in 2001 and 2002. The researchers evaluated articles from *The New York Times*, *Washington Post*, and *Wall Street Journal*, and found that coverage was quite limited, with 383 articles published in the two-year time span. A similar study examined national evening news programs’ (ABC’s *World News Tonight*, CBS’s *Evening News*, and NBC’s *Nightly News*) coverage of genetically modified foods between the years 1980-2003. The researchers identified a total of 169 stories about genetically modified foods that were aired over the 23-year period, which

represented less than .5% of all the stories presented on all three evening television news programs during that time frame. Researchers concluded that “coverage was sporadic and light, expect for the spikes associated around the infrequent crisis event” (Nucci & Kubey, 2007, p. 170).

Limited media coverage of genetically modified foods is likely one contributing factor that explains why Americans are not discussing the topic. A group of researchers at Rutgers University found in 2004 that 63% of Americans reported that they have never had a conversation about genetically modified food, and of the Americans who have had talked about it, 42% of the respondents claimed that they did so only once or twice (Hallman et al., 2004). The data suggest that most Americans infrequently have discussions about genetically modified food (Hallman & Hebden, 2005).

Americans appear to be somewhat uninformed about genetically modified foods, but many hold opinions about genetic modification technology. When asked if they approved or disapproved of genetically modified plant-based food products, 27% of the respondents approved, 23% disapproved, 38% were unsure, and 11% neither approved or disapproved (Hallman et al, 2004). These findings lead some researchers to believe opinions about genetically modified food are uncrystallized and highly malleable (Hallman & Hebden, 2005). In other words, many Americans have not yet formed opinions on the issue.

If there is a lack of public discussion, public awareness, and limited media coverage then public opinion has not been crystallized, which appears to be the current

state with Americans and genetically modified foods. However, in the following section, I will provide an example of one case in which public opinion was shaped about a food crisis. In this exemplar, opinion leaders and media coverage led publics to form opinions about milk containing the genetically modified rBTS hormone.

### **An Exemplar of Opinion Formation: rBTS Hormones in Milk**

Recombinant bovine somatotropin (rBTS), which is also known as recombinant bovine growth hormone (rBGH), is an artificial growth hormone that when injected into dairy cows can dramatically increase milk production (Weasel, 2009). In 1981 Monsanto acquired the patent on rBST, and by 1985 the Food and Drug Administration granted Monsanto permission to conduct large-scale field trials of the growth hormone, which increased milk production in dairy cows (Weasel, 2009).

Members of the scientific community in the U.S. had concerns about rBST. Maria Lyng, a researcher at the University of Vermont, was collecting data on stillborn and aborted calf fetuses, and some of the sample included cows treated with the rBST growth hormone. Later, Lyng was dismissed from her research at the university because she “asked awkward questions about the effects of BST” (Weasel, 2009, p. 153). However, Lyng did not leave quietly. Instead, she passed on the critical data she collected relating to rBST to Rural Vermont, a local activist group, as well as the Vermont House and Senate agricultural committees. After receiving the data, Rural Vermont commissioned a report, and found there was a relationship between rBST use and miscarried and deformed calf fetuses. Birth defects included:



A ‘bulldog’-type dwarf fetus that was aborted at six months; a ‘dipygus’ calf possessing a double pelvis and extra legs, which caused difficulties during birth leading to the death of the mother; and an ‘encaphalocoele’ fetus born to an untreated daughter of a rBST-treated cow that developed a large fluid-filled cavity in its head (Weasel, 2009, p. 155).

In addition, David Kronfeld, an agricultural and veterinary expert from Virginia Polytechnic Institute and State University, was commissioned by the Vermont state legislature to analyze Lyng’s data to identify significant conditions in rBST treated cows. Kronfeld identified three conditions: an increased incidence of retained placenta—which is the retention of fetal membrane after giving birth—and ketosis—a metabolic disorder that occurs when energy demands exceed energy intake, an elevated number of dead and deformed calves, and a higher number of “beefed” cows—cows that are slaughtered for their meat and not used for milking. In addition, the data suggested that cows given the rBST hormone had a higher likelihood of health problems, including an increased frequency of developing mastitis, an infection in the cow’s udders, and a decreased likelihood of reproductive success (Weasel, 2009).

The results of these studies were released in 1991, and garnered significant media attention, especially in key dairy states. Shortly after the release of these findings the University of Vermont and Monsanto made a joint public statement in the

*Journal of Dairy Science* that in their experiments, rBST treatment in cows significantly increased the occurrence of mastitis in dairy herds (Weasel, 2009).

Despite these findings, the Food and Drug Administration approved Posilac—Monsanto’s proprietary formulation of rBST—in November 1993, which marked the first time food derived from the use of genetically engineered drugs, could enter the American food system (Weasel, 2009). The Food and Drug Administration stated the product was safe and effective:

The agency [FDA] had determined after a thorough review that rBST is safe and effective for dairy cows, and that milk from rBST-treated cows is safe for human consumption, and that production and use of the product do not have a significant impact on the environment. In addition, the agency found that there was no significant difference between milk from treated and untreated cows and, therefore, concluded that under the Federal Food, Drug, and Cosmetic Act, the agency did not have the authority in this situation to require special labeling for milk from rbST-treated cows (Food and Drug Administration, 1994).

Milk acquired from dairy cows given the rBST hormone hit the supermarket shelves in 1994, and by 2002, eight years after its approval, 22% of the nation’s dairies used the rBST hormone. However, outside the United States rBST treated milk

had been rejected. For example, in 1999 the European Union and Canada banned rBST treated cows and milk (Weasel, 2009).

In the U.S. a grassroots movement resisting rBST milk began to take shape in Oregon in 2002. Rick North, who had a twenty-one-year career with the American Cancer Society, led a campaign to educate the public on rBST. North started by organizing a group of concerned doctors, scientists, and other activists who shared a passion for educating the public about rBST (Weasel, 2009).

The resistance group began its efforts with a three-pronged approach, first making public presentations to groups and businesses (such as the Rotary club, high schools, colleges, etc.). Next, North contacted Oregon dairy farmers who were using rBST hormone to see if he could meet with them to talk about the hormone. The third approach consisted of passing out post cards to people who attended his talks, which the attendees were asked to sign their names and print their addresses on the post cards and send them to dairy farmers. The post cards read “We’ve got problems with this, we’re concerned that you use rBGH, and would you please consider stopping its use and labeling so the public would know?” This approach turned out to be quite successful, with people sending in the signed post cards by the hundreds and later by the thousands (Weasel, 2009).

The first big breakthrough in the campaign against rBST was with Tillamook County Creamery Association, a cooperative dairy in Oregon which is the nation’s second largest producer of chunk cheese. Tillamook decided to stop using rBST. A local TV reporter broke the story in April, 2005, and Tillamook received more than

6,500 public comments, with 98% expressing opposition to rBST. Tillamook's decision triggered action when smaller dairies in Oregon and Washington stopped using rBST (Weasel, 2009).

After being successful at encouraging local dairies to stop using rBST, North stepped up his campaign to include outreach to institutions such as schools and hospitals that purchased large volumes of dairy products. In addition, the movement began to spread to dairies across the country. By the end of 2006, dairies in New York, Texas, New Jersey, and Montana had stopped using rBST (Weasel, 2009).

Another noteworthy event occurred when Chipotle, a national chain restaurant, issued a press release on November 5, 2007, that stated, "First and Free: Chipotle Mexican Grill is the Nation's First Chain to Go Entirely rBGH-Free" (p. 173). Chipotle pledged to stop using such milk products and quoted the results of a recent survey conducted by the Opinion Research Corporation that found 81% of respondents preferred to purchase dairy products from cows not treated with synthetic hormones.

North met with the executives of Starbucks, the world's top retailer, roaster, and brander of coffee, to explore their use of rBST treated milk in their coffee products. After much deliberation Starbucks decided to stop using rBST treated milk by the end of 2007. And in early 2008 Starbucks issued the following press release:

We pride ourselves on the understanding we have developed for our customers' desires based on our close relationship with them. We took this step

exclusively in response to continued customer demand for dairy produced without the use of rBGH (p. 172).

Shortly after Starbucks stopped using milk from cows treated with the rBST hormone, Kraft, the nation's largest provider of chunk cheese, announced in 2008 that its entire line of low-fat cheeses would be rBST-free.

North's grassroots campaign was successful at getting some dairy farms and businesses to stop using milk from cows treated with the rBST hormone. The final victory for the campaign came in August 2008 when Monsanto issued a press release announcing to divest—or stop developing—its rBST operation and product, which was thought to be a reaction to consumer rejection (Weasel, 2009).

This exemplar of the rBST hormone and the process of public opinion formation has some parallels with the current genetically modified food debate. For example, initially there was little resistance from American consumers to purchase milk produced with the rBST hormone. Second, the FDA determined that rBST milk did not need to be labeled. In the milk example, North personally took on the task of talking with opinion leaders. He was successful at encouraging local dairies to stop using the rBST hormone, and when Tillamook agreed to stop using rBST, other dairies followed suit. In many ways Tillamook was an opinion leader that modeled behaviors for other corporations.

Rick North was instrumental in the public opinion formation process. He framed and modeled behaviors that were adopted by others. North was successful at bringing attention to the rBST issues and engaging publics in the debate.

The exemplar shows us that American publics will engage in food issues and form opinions when they have an increased interest and access to information. The milk example also highlights the importance of opinion leaders. It seems likely that without North's campaign efforts public opinion formation and behavior change regarding rBST may not have developed to the extent that it did.

In the case of genetically modified foods, American lay publics have yet to engage in the debate. We learned from the milk example that American publics will engage in food issues but it appears that they need to be motivated to do so.

## **Chapter 4: The Organic Food Movement**

The debate surrounding the genetically modified food controversy is broad and far reaching. It would be challenging to examine the genetically modified food debate in its entirety, so for the purpose of this study, I narrowed my examination to the organic food community for the following reasons: the organic food community actively resists genetically modified foods (Lyons, Lockie & Lawrence, 2004); there has been a recent spike in interest and acceptance of organic foods by the American public (Koivisto Hursti & Magnusson, 2003); and finally, organic foods have become an \$11 billion dollar industry in the U.S. and it is the fastest growing sector of the food economy (Pollan, 2006).

Organic production systems have been practiced since humans first cultivated plants and tended livestock; however, formalized written standards of organic processes have only been put into place since the 1940s (Kinner, 2004; Lyons, Lockie & Lawrence, 2004). Organic agricultural production uses natural, sustainable processes (Lyons, Lockie & Lawrence, 2004), and rejects the use of artificial fertilizers, synthetic chemicals, and genetically modified components (Shiva & Bedi, 2002; Madeley, 2001). From the organic perspective these practices would inevitably produce plants and animals of poorer health, which would in turn promote poorer health in humans (Reed, 2002). Organic farming embraces traditional farming practices such as crop rotation, nutrient cycling, nitrogen fixation, soil regeneration, cover cropping, and the use of pest predators (Madeley, 2001). In addition, the organic food culture also embraces and seeks relationships with organic food

producers and consumers. The organic model seeks to bring farmers and consumers closer together to promote locally grown and raised food, to expand knowledge on how foods are produced, and to increase economic viability of farmers who want to disengage from large corporate food production and distribution systems (Lapping, 2004).

The organic food and agriculture movement has expressed a unified voice in opposition against genetically modified technology because biotechnology is seen as an unnatural system of production driven by profit (Lyons, Lockie & Lawrence, 2004). These sentiments appear to be true for Swedish consumers. For example, Koivisto Hursti and Magnusson (2003) conducted an opinion study on Swedish consumers' perceptions of genetically modified foods and organic foods. Koivisto Hursti and Magnusson found that most respondents held negative views towards genetically modified foods. The majority of respondents used the following attributes to describe genetically modified foods as: "no benefit," "tampering with nature to a very great extent," "high risk," "very unethical," "not healthy," and "used for profit only." Organic foods, on the other hand, were positively described by most respondents, and organic foods were associated with "no concerns," "no risks," "healthy," "not being used for profit only," "serving a good purpose," and "necessary." Therefore, it appears that some consumers see organic food as an alternative to genetically modified foods.

Opinions about artificial fertilizers, pesticides, genetically modified technology, human health, and environmental sustainability are the main drivers that



influence people to buy and consume organic food (Kinnear, 2004). In recent years the global organic food production has seen a dramatic increase in demand. For example, global sales of organic goods were at \$8 billion dollars in 1990 and shot up to \$25 billion in 2002 (Lyons, Lockie & Lawrence, 2004). Much of the consumer and media interest in organic foods is attributed to its status as the clearest and highest profile alternative to mainstream agriculture and genetic modification technology (Lyons, Lockie & Lawrence, 2004). Researchers suggest that consumers embrace organic food based on taste, higher employment on farms, improved animal welfare, improved working conditions, and local and regional production (Kinnear, 2004).

In summary, the organic community opposes genetically modified foods because the technology conflicts with the guiding principles of organic farming. In addition, organic farming is seen as an alternative, and in some cases a way to resist genetically modified foods, which has ultimately put organic farming in the genetically modified food debate. However, it is unclear if the organic food community has taken a public stand against genetically modified foods, but with the increase in consumer demand for organic foods it appears that the public is embracing at least some part of the organic message and ideology.

## Chapter 5: Methods

The literature tells us that most Americans seem to be somewhat ambivalent and uninformed about genetically modified food (Hallman & Hebden, 2005).

However, some publics are engaging in the GM debate, such as the organic food community. The organic food community is engaged in the debate because it rejects the use of artificial fertilizers, synthetic chemicals, and genetically modified seeds in crop production (Lyons, Lockie & Lawrence, 2004). These findings lead me to question why some publics are engaging in the debate while the majority of Americans are not. To address this I wanted to speak to opinion leaders in the organic food community to try to understand why this is an important issue for opinion leaders and their community. Recall that the literature on opinion leadership suggests that opinion leaders are vital in public opinion formation because they disseminate information and model behaviors for the people with whom they are influential (Rogers, 2003).

The rBST milk exemplar demonstrated that American publics will engage in food issues and form opinions when they have an increased interest and access to information. Opinion leaders were vital in rBST opinion formation because they brought attention to the issue, framed and modeled behaviors that were adopted by others, and engaged publics in the debate. Therefore, opinion leadership is an important component of public opinion formation. Perhaps opinion leaders in the organic food community can illuminate the barriers that are affecting many American publics from engaging in the genetically modified food debate.

## Research Questions

The current study's aim is to understand public opinion formation by determining what factors influence opinion leaders to engage in the genetically modified food debate, and how opinion leaders describe American lay publics' engagement in the debate. The first research question attempts to bring together the heart of the organic food community with the role of opinion leaders in fostering opinion formation. The primary research question for this study is:

*Research Question 1: What factors influence opinion leaders in the organic food community to engage in the genetically modified food debate?*

Let us turn to the key elements of the research question. First, in terms of “*what factors*,” I wanted to leave “factors” open to allow differing reasons and motives to emerge. Therefore, **factors** will refer to any reason or motive that a participant refers to that influences him or her to engage in the genetically modified food debate.

In past studies *opinion leaders* have been defined as people who influence the opinions, beliefs, motivations, and behavior of others (Valente & Pumpuang, 2007); people who are the most concerned about an issue as well as the most articulate about it (Lazarsfeld et al., 1944); and people who have higher levels of interest, knowledge, and social recognition about a specific issue than non-leaders (Weiman, 1991). For the purpose of this study an **opinion leader** will be defined as a person who is positioned

to influence the opinions, beliefs, motivations, and behaviors of others because he/she holds high levels of interest and knowledge about genetically modified foods.

The organic food community has been described as farming communities focused on producing sustainable, environmentally friendly, healthy food (Shiva, 2004), which use natural, sustainable processes (Lyons, Lockie & Lawrence, 2004) and rejects the use of artificial fertilizers, synthetic chemicals, and genetically modified components (Shiva, 2004; Madeley, 2001). For this study, the *organic food community* will be defined as a community that uses natural and sustainable processes to produce food.

The underpinning for *engagement* stems theoretically from Gene Rowe and Lynn Frewer's (2005) definition of public engagement as "the relevant information (knowledge and/or opinions) from the maximum number of relevant sources and transferring this efficiently to the appropriate receivers" (p. 14). I interpret this definition to mean that information and opinions are effectively shared between as many individuals and publics as possible.

*Genetically modified food* will be defined as food that is derived from seeds that were altered through gene transfer where the genetic makeup of the seed was changed (Hallman, Hebden, Cuite, Aquino & Lang, 2004).

Finally, in regards to *debate*, I will use Guy Cook, Peter Robbins, and Elisa Pieri's (2006) definition of "GM debate," where *debate* refers to, "general discussion in a variety of forms" (p. 2). It is important to note that I refer to "debate" in a broad and all-encompassing way where the main focus is on discussions.

Turning to the second research question, recall that the literature suggests that many Americans are somewhat ambivalent and uninformed about genetically modified foods (Hallman & Hebden, 2005). Therefore, I am interested in discovering what opinion leaders think about overall understanding and engagement among lay publics regarding the genetically modified food debate. In other words, will opinion leaders echo that lay publics are uninformed and ambivalent about GM foods?

*Research Question 2: How do opinion leaders describe the level of engagement with the genetically modified food debate on the part of general (lay) American publics?*

Recall that I defined an **opinion leader** as a person who influences the opinions, beliefs, motivations, and behaviors of others, and holds high levels of interest and knowledge about genetically modified food. I will also use the above mentioned definition for engagement, in which **engagement** refers to “the relevant information (knowledge and/or opinions) from the maximum number of relevant sources and transferring this efficiently to the appropriate receivers” (Rowe & Frewer, 2005, p. 14). Finally, **American publics** will refer to non-science (lay) individuals.

## **Qualitative Approach**

To effectively address the current study's research questions I chose to use a qualitative approach. One of the primary features of qualitative research is the ability to explore the perspectives of participants and their diversity (Flick, 2006). Therefore, the qualitative approach is the most appropriate because I am interested in uncovering what factors influence opinion leaders to engage in the genetically modified food debate, and how opinion leaders describe American lay publics' engagement in the debate. For example, it would be unlikely that a quantitative survey with a structured likert scale would be able to accurately represent the deep meaning of the participants' experiences with the genetically modified food debate, which further justifies the use of a qualitative approach.

Another feature of qualitative research that is important in the current study is reflexivity of the researcher. The researcher's reflections, observations, and impressions, irritations and feelings help form the interpretations of the study. More specifically, "the subjectivity of the researcher and of those being studied becomes part of the research process" (Flick, 2006, p. 16). This suggests that qualitative methods take the researcher's communication with the participants as an explicit form of knowledge rather than an interviewing variable.

A major component of qualitative research is credibility. Specifically, "The credibility of qualitative inquiry is especially dependent on the credibility of the researcher because the researcher is the instrument of data collection and the center of the analytic process" (Quinn Patton, 1990, p. 461). Therefore, I took the following

measures to ensure that the current study was valid and credible. First, I used low-inference descriptors, which involved using verbatim accounts of what participants said. Second, I used critical rationalism, which refers to making efforts to falsify initial assumptions about the data and looking for disconfirming evidence of the researcher's interpretations (Silverman, 2001). Third, I continuously returned to the data to verify that the constructs, coding categories, explanations, and interpretations were accurate and reflected the phenomena under study (Quinn Patton, 1990). Finally, I participated in peer debriefing with fellow graduate students and members of my thesis committee. Peer debriefing is the act of regularly meeting with other people who are not involved in the research so the researcher can discover holes in her research, discuss the results of her study, and gain differing perspectives on her work (Flick, 2006).

### **Interview methodologies.**

To address the research questions, I chose to use interview methods, which allowed me to obtain a deep understanding of opinion leaders and their level of engagement within the genetically modified food debate. In-depth interviews offer a rich source of data which provides access to individuals' lived experiences and how they view the world (Silverman, 2001). Moreover, Marshall and Rossman (2006) suggested that studies focusing on individuals' lived experiences typically employ in-depth interviews because interviews can capture the deep meaning of experience in the participants' own words. In-depth interviews tend to be like a conversation, rather than a formal event with predetermined response categories. "The most important aspect of the interviewer's approach is conveying the attitude that the participant's views are

valuable and useful” (Marshall & Rossman, 2006, p.101). Therefore, I framed my interviews in a way to allow in-depth data gathering, which can provide thick, rich descriptions that are nested in a real context, and allows the researcher to better understand the lived experiences of the participants (Miles & Huberman, 1994). When studying an individual’s thoughts, opinions, feelings, beliefs, and values, the researcher needs to understand the deeper perspectives that can be captured through conversations.

I argue that, for this study, it was necessary to use qualitative interview methodologies to accomplish the following goals: obtain a deep understanding of opinion leaders’ experiences with the genetically modified food debate, identify the factors that influence opinion leaders to engage in the debate, and explore opinion leaders’ feelings and views about American publics’ level of engagement in the genetically modified food debate.

## **Operationalizations**

John Creswell (2007) argued that interview questions, in qualitative research, are narrowed from a study’s central research questions. Therefore, the interview questions in this study stem directly from the research questions. Prior to interviewing the research participants, I piloted my interview questions with friends, co-workers, and fellow graduate students to determine if the questions made sense, were easy to understand, and were not leading. After testing the interview questions I edited and threw out problematic questions based on the recommendations of the pilot



participants. For example, during the piloting of my interview questions several of the pilot participants had some issues with one of my questions: “How do you define genetically modified food?” Specifically, many participants felt like it was a “test” question, which caused some anxiety in their response. However, I felt like it was an important question to include because the topic of genetically modified food is broad, and I wanted to understand how the research participants defined it so we could establish common ground and I could better understand their perspectives. To address the recommendations of the pilot participants, when conducting interviews with the research participants I included the following disclaimer after asking them to define genetically modified foods. “This is not a test question, but rather an opportunity to share how you define genetically modified foods for yourself, and there is no right or wrong answer.”

In the following section I explain the theoretical linkages and the rationale behind each interview question.

### **Research question 1.**

Recall that Research Question 1 asks: *What factors influence opinion leaders in the organic food community to engage in the genetically modified food debate?*

First, I wanted to address the issue of opinion leadership. Are the participants in fact opinion leaders? Recall, that the literature suggests that opinion leaders are individuals who have high levels of interest in a specific issue or topic, greater levels of media attention and issue-specific knowledge (Katz, 1957). In addition opinion

leaders have higher level of interest, knowledge, and social recognition about a specific issue than non-leaders (Weiman, 1991). Therefore, I wanted to determine if the participants exhibited opinion leadership characteristics, so I asked the following questions:

*Question: How did you first become interested in genetically modified food?*

*Question: How knowledgeable do you feel about genetically modified food?*

*Question: How do you define genetically modified food?*

*Question: Do you remember if there was a turning point or anything that really influenced you after hearing about genetically modified food?*

*Question: Are there other areas about genetically modified foods you would like to know more about?*

In order to address the issue of “what factors” influence opinion leaders to engage in the debate regarding genetically modified food, recall that the literature suggests that opinion leaders are highly attentive to specific issues, have greater levels of knowledge about an issue, and pay close attention to media coverage of an issue (Katz, 1957). In order to determine whether genetically modified food opinion leaders were influenced by the factors suggested in the literature, I attempted to get responses to sources of information used by opinion leaders and asked the following questions:

*Question: What informational sources do you use to stay informed about genetically modified food? Why do you choose to use these sources?*

*Question: Are there informational sources that you have come across that you choose not to use to stay informed about genetically modified food? Why?*

I also asked questions to reveal interpersonal sources opinion leaders use to engage in the genetically modified food debate. Recall that the literature suggested that opinion leaders communicate to their circle of friends, peers and colleagues about their area of interest (Katz, 1957). Such questions were worded as follows:

*Question: Do you discuss genetically modified foods with others?*

*Question: Do people come to you to get information or talk to you about genetically modified food?*

I also asked questions about opinion leaders' opinions about genetically modified foods. I wanted to know what their views and opinions were. Therefore, I asked the following questions:

*Question: Do you think there is a controversy around genetically modified food? What does it involve?*

*Question: What's your opinion about genetically modified food?*

Finally, I wanted to see how solidified the participants' opinions were. Recall that Davison (1958) believed that opinions are not fully formed until individuals make behavioral adjustments. Therefore, I wanted to know if the participants made behavior changes after learning about genetically modified foods to provide evidence of a solidified opinion. I asked:

*Question: How is your life affected by the presence of genetically modified food? Has anything changed?*

## Research question 2.

In terms of the second research question: *How do opinion leaders describe the level of engagement with the genetically modified food debate on the part of general (lay) American Publics?* Recall that the literature suggests that many Americans are somewhat ambivalent and uninformed about genetically modified foods (Hallman & Hebden, 2005). I wanted to see if the participants would confirm Hallman and Hebden's (2005) findings. Therefore, I asked the following questions:

*Question: Do you think the average American understands what genetically modified foods are? Why or why not?*

*Question: According to national opinion polls Americans are uninformed about genetically modified food. Why do you think they're uninformed?*

In addition, I wanted the participants to share their thoughts on how to increase the American publics' engagement with the genetically modified food debate. These recommendations could illuminate specific areas that need more attention to increase American publics' engagement with genetically modified foods. Therefore, I asked:

*Question: What do you think is the best way to inform American people about genetically modified food?*

To create a comfortable interview environment for the participants I started off with "icebreaker" questions (Creswell, 2007). These questions were intended to put the participants at ease and to begin to feel comfortable with the interview process:

*Question: What is your position at the Learning Garden Laboratory? How long?*

*Question: Why is it important for you to work/volunteer at the Learning Garden Laboratory?*

Finally, I was interested in the participants' thoughts about living in Portland, Oregon, and if proximity affected their views of genetically modified foods. According to Multnomah Food Initiative, a Portland based non-profit organization, the Portland area is home to numerous food-related grassroots efforts and Farmer's Markets, as well as many government led food related initiatives. Further more, Multnomah Food Initiative claims there is a growing interest in organic gardening, which indicates community support for food related issues (Multnomah Food Initiative, 2010). Therefore, I wanted to know what the participants thought about living in Portland, and whether living in Portland impacts how they viewed their level of engagement in the GM food debate:

*Question: Do you think living in Portland affects the way you think about genetically modified foods? Why?*

### **Selecting a Population and Sample**

Because I am interested in opinion leaders from the organic food community, I selected the Learning Garden Laboratory as my population of interest.

The Learning Garden Laboratory is located in Portland, Oregon, and provides K-12 and college students hands-on experience and education in sustainable gardening

and healthy nutrition (Learning Garden Laboratory, 2009). The facility was established in 2005 through a partnership between Portland State University, Portland Public Schools, Portland Parks and Recreation, and Oregon State University Extension Services. The primary goals of the Learning Garden Laboratory are to (a) provide educational experiences for students that promote earth friendly local food production; (b) to educate students about permaculture principles and earth-friendly gardening methods, inform students about nutrition and healthy eating habits, and share the medicinal/healing properties of plants; (c) to support the regional food economy by raising awareness about the importance of local agriculture; and finally, (d) to become a national model that extends beyond food production to teaching children and youth and increasing their academic achievement (Learning Garden Laboratory, 2009). The facility currently houses one full-time faculty member, two part-time staff members, two graduate assistants, two garden educators, six student interns, and about 225 volunteers per year.

### **Sample.**

To obtain a sample I used a snowball sampling technique. Snowball sampling is a nonprobability sampling method where each participant interviewed is asked to suggest additional people for interviewing (Babbie, 2004). To begin, five potential participants were referred to me by the director of the Learning Garden Laboratory. I recruited these potential participants by email. The email inquired to see if they would like to participate in the study. The participants had to meet the following criteria to

participate: (a) eighteen years of age or older; (b) past or present affiliation with the Learning Garden Laboratory. However, prior to contacting potential participants about participating in the study, I acquired human subjects approval from the Portland State University Human Subjects Research Review Committee (Appendix A). Human subjects approval is an independent evaluation of a study's construct to ensure that adequate protections are in place for human subjects.

To determine the size of my sample I relied on saturation or strong reoccurring patterns in interview content as a guide (Creswell, 2007). Saturation means that the researcher finds that no new data are being unearthed, and any new data would only add, in a minor way, to the major themes and patterns that have emerged. Saturation is a commonly accepted practice used by qualitative researchers (Strauss & Corbin, 1998). For example, Yehya and Dutta (2010) conducted in-depth interviews with elderly Druze women and their caregiver daughters to develop an understanding of the intersections of religion and health and how it impacts aging women in the Lebanese community. The researchers conducted interviews with participants until they reached saturation, which resulted in a total 13 elderly women and 10 daughters.

In the current study I conducted interviews with participants until I noticed reoccurring patterns and themes in the data. To start my sample the director of the Learning Garden Laboratory referred five potential participants, and of those five, three agreed to participate in this study. Then I asked those participants to refer other potential participants to be interviewed. The participant referrals produced four more

participants who agreed to participate. I stopped recruiting more potential participants after my seventh interview because I reached saturation.

## **Interview Procedure**

After the participants agreed to be interviewed, I scheduled a meeting with each participant to conduct the interview. Before beginning each interview, participants were required to give informed consent. Informed consent means that participants are aware of their rights as a research participant and are aware of what their participation will entail. Interviews were conducted using a script of open-ended questions, as discussed earlier. (The complete list of interview questions is located in Appendix B). One criteria of qualitative research is the trustworthiness of the researcher (Flick, 2006). Therefore, to create a safe and trusting environment for the research participants I tried to convey the importance of their experience with the genetically modified food debate and show genuine interest in their story and responses. In addition, to ensure that I accurately captured the participants' lived experiences I asked each participant the following questions at the end of each interview: "Is there any part of your experience with the genetically modified food debate that I missed or has not been captured in our interview? Is there anything else you would like to include that is important to you regarding these issues?"

Six of the seven interviews were conducted in person either on the Portland State University campus, at local coffee shops, or at the Learning Garden Laboratory. One interview was conducted over the telephone because it was most convenient for



the participant. The duration of the interviews ranged in time from approximately 22 minutes to 55 minutes.

Each interview was voice recorded in its entirety. Participants were told that they were not obligated to answer any question(s) they did not feel comfortable answering, and the audio recorder could be turned off at any time. No participant avoided an answer (although some did respond with “I don’t know”), nor did any participant request the audio recorder be turned off. In addition, all names were changed to protect the participants’ anonymity.

## **Data Analysis**

The audio recordings of the interviews were transcribed, reviewed, coded and analyzed by the author. I read than re-read the transcripts to become familiar with the data. Next, I reviewed each transcript to identify meaningful themes that emerged. Finally, the data were placed into coding categories, and statements were considered in terms of frequency, extensiveness, intensity and specificity to identified themes. Qualitative data analysis is a continuous iterative process (Miles & Huberman, 1994). Throughout the analytic process the researcher engages in data reduction, display, and conclusions (Coffey & Atkinson, 1996).

Before reading the interview transcripts I created a coding start list. Miles and Huberman (1994) recommend creating a start list that comes from the study’s conceptual framework and research questions, which is a form of “anticipatory data reduction.” That is, the conceptual framework and research questions provide the first

lens through which the data can be viewed, focused, and sorted. Embedded patterns and themes within the data emerge through this process, which allows for categorization of these data (Miles & Huberman, 1994). Therefore, during my initial read through of the data I thought about what factors influenced the participants to engage in the genetically modified food debate. I first read and then reread the interview transcripts to become familiar with the data. I did not physically code the transcripts; instead I was more focused on recognizing themes and immersing myself in the lived experiences of the participants.

After this “first pass,” I noticed the similarities and differences in the ways in which the participants talked about their experiences with genetically modified foods and how they engaged in the debate.

### **Coding the transcripts.**

After reading and reflecting upon the seven transcripts, I created a coding list so I could organize and code the data (Appendix C). Coding is the process of data simplification or reduction, where the main purpose is to retrieve data segments categorized under the same codes. More specifically, coding serves as a function to identify and reorder data, which allows the data to be thought about in new and different ways. According to Coffey and Atkinson (1996) Coding has three functions: (a) identify relevant phenomena, (b) collect examples of those phenomena, and (c) analyze those phenomena in order to find commonalities, differences, patterns, and structures.

Broadly, the items from the coding sheet were related to the factors that influenced opinion leaders to engage in the genetically modified food debate. However, I was open to other, more unanticipated themes as they emerged. The coded items were: **(Code 1)** the reference to opinion leadership behaviors (interest in the genetically modified food debate, knowledge of genetically modified foods, having discussions with others about genetically modified foods, etc.); **(Code 2)** the reference to engaging in the genetically modified food debate (seeking out information about genetically modified foods); **(Code 3)** the reference to opinion formation (learning about genetically modified foods, expressing one's opinion, changing one's behavior, etc.); **(Code 4)** reference to living in Portland, Oregon; **(Code 5a)** reference to American publics' engagement with genetically modified foods, and **(Code 5b)** recommendations on how to increase American publics' awareness, understanding, and engagement in the genetically modified food debate.

For my first cycle of coding I was specifically looking for the individual elements of the codes. For example, for Code 1 (opinion leadership behaviors) I identified participants' interests in genetically modified foods and grouped these together. Next, I explored the data looking for each participant's discussion of his or her knowledge of genetically modified foods and grouped these together. Then I coded for participants talking about their discussions of genetically modified foods with others and grouped these together. I used this protocol for each code. I found that it was useful to look at each portion of the code individually before collapsing it together.

For the second round of coding I looked for patterns within the codes and for meaningful information that was not captured by the existing codes. For example, I noticed that several of the participants talked about how they felt that many people have become interested in organic foods and food issues in recent years. Specifically, some participants cited the success of films, such as *Food Inc.*, and books like *The Omnivore's Dilemma* as a reflection of this new founded interest in food issues. Therefore, I expanded Code 5a (Americans' engagement with genetically modified foods) to include "recent public interest in the genetically modified food debate."

At this point, I had fine-tuned the codes and reduced the data into meaningful segments, which aided in answering my research questions. An in-depth analysis of the data will be explored in the next chapter.

## Chapter 6: Findings

Interviews were conducted from December 2009 to January 2010 in Portland, Oregon. A total of seven participants from the Learning Garden Laboratory were interviewed. I conducted interviews with participants until saturation—strong reoccurring patterns in interview content (Creswell, 2007)—occurred. The sample consisted of a range of employees, students and volunteers, which included five women and two men, and each participant was assigned a pseudonym to protect his or her identity.

Following is background on each participant. “Tony” is a graduate student in the Leadership in Ecology, Culture, and Learning program at Portland State University. Tony has been a Garden Educator at the Learning Garden Laboratory for three months. An Oregon native, Tony spent the first part of his life on a farm, and finds his work at the Learning Garden Laboratory important because he wants to educate youth and adults about gardening.

“Jennifer” is also a graduate student in the Leadership in Ecology, Culture, and Learning program at Portland State University. Jennifer has been a Garden Educator at the Learning Garden Laboratory for about two years. Like Tony, she is an Oregon native, and she is passionate about empowering people to grow their own food. Jennifer finds her work at the Learning Garden Laboratory meaningful because she wants to help people develop relationships with their food.

“Stephanie” is an undergraduate student who is studying biology. Stephanie plans to go into naturopathy once she finishes her undergraduate work. Stephanie

volunteered at the Learning Garden Laboratory for about ten weeks while she was completing her senior capstone requirements. A capstone is a ten-week course where students spend the majority of their time in the field working on teams with other students, university faculty and community partners to understand and find solutions for important issues. Stephanie specifically chose the Learning Garden Laboratory capstone because she was interested in local food systems—a collaborative network that integrates sustainable food production, processing, consumption and waste management that is aimed at enhancing the environmental, economic, and social health of a community (University of California, 2010).

Prior to working at the Learning Garden Laboratory, “Kristin,” studied at the University of Vermont, and after college she taught gardening and nutrition to elementary students. Kristin has been working at the Learning Garden Laboratory for about a year and a half as a program assistant. Kristin does a variety of tasks, but she primarily works with students and volunteers, and she has a lifelong interest in people and plants.

“Ann” is a doctoral student in biology at Portland State University, and she completed her undergraduate studies at Evergreen State College where her focus was on sustainable agriculture. Ann’s current research is examining the effects of genetically engineered crops on soil organisms. Ann believes her interests in sustainability and environmental issues developed from growing up on a farm in Oregon. Ann’s connection to the Learning Garden Laboratory stems from attending a Master Gardener Organic Program.

“Charlie” was a high school biology teacher before he started working at the Learning Garden Laboratory. Charlie has been doing administrative work for the Learning Garden Laboratory for about a year and a half, and he enjoys his work because he likes doing hands-on garden based education where he can “get people’s hands dirty.”

“Veronica” is also a graduate student in the Leadership in Ecology, Culture, and Learning program at Portland State University and she has been volunteering at the Learning Garden Laboratory for about four months. Veronica is a mother of two, and has been in Portland, Oregon, for about eight years. Prior to moving to the city, Veronica lived in a rural eastern Oregon town for about twenty-seven years. Veronica enjoys her volunteer work at the Learning Garden Laboratory because she likes connecting with her community and having access to local foods.

## **Opinion Leadership**

Recall that Research Question 1 asked, *What factors influence opinion leaders in the organic food community to engage in the genetically modified food debate?*

However, before examining engagement it is important to determine if the participants demonstrate opinion leadership behaviors. The literature suggests that opinion leaders are individuals who have high levels of interest with a specific issue or topic, greater levels of media attention and issue-specific knowledge, and discuss issues with others (Katz, 1957). In addition opinion leaders have higher levels of social recognition about specific issues than non-leaders (Weiman, 1991).

**Interest.**

All of the participants were interested in the genetically modified food debate. However, their interests developed for different reasons. I noticed two common patterns: some participants had a lifelong interest in food, while others became interested in the genetically modified food debate after being exposed to the topic (school, friends, and other interests).

Several of the participants mentioned that they have had a long term relationship with food. Kristin shared that, “I have had a lifelong interest in people and plants...I’m passionate about food, and nutrition, and people’s connection to plants.” Similarly, both Tony and Ann also had life long interests in food. They mentioned growing up on farms, which led to their interests in food and the genetically modified food debate. For example, Ann said, “It’s been a part of my life for a really long time. I studied sustainable agriculture as an undergrad, I grew up on a farm, sustainability and I guess environmental awareness has also been a big part of my life.” Tony also connected his experience of growing up on a farm to his interests in the genetically modified food debate:

I grew up on a farm, so it was, you know, a traditional farm. We grew corn, it was probably genetically modified, and you know, when I started learning about organic farming when I got into college my experiences in conventional farming really got me interested in different practices and the different yields and how different it was...so I became really interested in that, the difference.



Another commonly mentioned avenue for developing an interest in the genetically modified food debate was learning about genetically modified foods through school, friends, or other interests. Charlie said, “I suppose when I started learning about organic gardening that was one of the topics associated with it [genetically modified food]...I just started doing reading and research, and that’s where my interest in that realm began.” Stephanie also became interested in the genetically modified food debate through reading: “I became vegan, and some people I knew were becoming vegan and reading about food and stuff, and I started to read the books they were reading and I got real interested in them [genetically modified foods].” Jennifer mentioned that she initially became interested in the genetically modified food debate when she learned about genetics in high school, but her interests “really escalated with my personal life and learning how to grow food and traveling.” Veronica’s interest in the genetically modified food debate developed out of concerns for her family’s nutritional health. She said, “Initially my interest came out of nutrition for my family and for my children. I had my first son in the late 1970’s and I was very interested in organic foods...and I wanted to have an understanding of what GMO foods were.”

In summary, all of the participants were interested in the genetically modified food debate, which is one characteristic of opinion leadership.

## **Knowledge.**

Recall that the literature suggests that opinion leaders tend to be more knowledgeable about specific issues than their peers (Weiman, 1991). All seven participants felt that they had at least an “above average” understanding of genetically modified foods. The majority of the participants were very confident in their knowledge of genetically modified foods. For example, Ann said, “In terms of the general public I’m probably an expert, but I always feel like there’s so much more to learn.” Charlie was also very confident in his understanding of the genetically modified food debate. He said, “I used to teach high school biology and I would have a unit on genetically modified organisms, so, I know it pretty well. I mean I know more or less the major issues and developments, and issues associated with it, certainly.”

Some of the other participants felt like they had a good understanding of the social and political issues, but they were unclear about the science behind genetically modified foods. For example Tony said that, “I’m becoming fairly knowledgeable about non-genetically modified foods...but as far as knowing the science going into it [genetically modified foods], I’m very ignorant.” Similarly, Veronica said:

My knowledge is layman’s knowledge; in other words I don’t know if I would scientifically be able to explain genetically modified foods to someone, but I could certainly speak to the political impact and the social impact on me as a consumer and on our farming agriculture community...so, I would say I have above average knowledge.

In summary, all of the participants feel fairly knowledgeable about the genetically modified food debate. However, some participants were more confident in their understanding of the genetically modified foods than others.

### **Discussions with others.**

The literature suggests that opinion leaders discuss issues of interest with their peers (Rogers, 2003). All of the participants did have discussions with others about the GM debate. Some of the participants said that they had frequent discussions with others. For example, Veronica stated, “Oh yeah, constantly. I would say on a daily basis.” Similarly, Tony said, “It’s pretty much all I talk about...I mean there are a lot of other issues that tie into it, but I think that everything ties into the food system.” Kristen stated, “Yeah, definitely with students out here at the garden that tends to be where the topic comes up.” However, Kristen said that her conversations also include different aspects of food-related issues. “People kind of more broadly like to talk about food systems and local food systems and kind of issues about food systems and how that relates to the economy and how that relates more to connect farms and schools.” Jennifer also mentioned having daily discussions about the GM debate and food politics:

Absolutely, I think food politics are very much the norm with a lot of my friends...I mean it’s my livelihood, it’s like, what I do; it’s what I want to

bring to the masses. So yeah, it's definitely part of daily discussions and educating your family about it and your friends and making sure everyone is on the same page.

However, two of the participants seemed more guarded when having discussions with others about the genetically modified food debate. For example, Charlie said, "When I'm asked I do. I don't generally volunteer to talk about it; one of my colleagues does...so I sort of leave it to him to talk about." Stephanie also talked about limiting her conversations about genetically modified foods:

So, yeah, I guess I talk about it a lot, but, I don't talk about a lot of politics very much, so like different angles...I tend to avoid talking to family about it or anybody who's too excited politically, like I play it down. I prefer to talk to my lab-mates.

In summary, all of the participants appeared to be opinion leaders in the genetically modified food debate because they seemed to have an elevated interest in the topic, appeared to be knowledgeable about the genetically modified food debate, and participated in discussions with others about the genetically modified food issues. Some of the participants seemed to be more active in the debate than others, and they all appeared to be opinion leaders. However, it is important to note that all of the

participants seemed to be opinion leaders in food related issues, which is broader than just genetically modified foods.

### **Engaging in the Genetically Modified Food Debate**

Recall that the literature suggests that opinion leaders are highly attentive to issues and pay close attention to media coverage of an issue (Katz, 1957). As previously mentioned, the participants in this study are interested in the genetically modified food debate, hold high levels of knowledge about genetically modified food issues, and have discussions with others about genetically modified foods. In terms of attending to media coverage of the genetically modified food debate, the participants used various sources to stay informed. The most common sources named were: scholarly articles, books, college courses, peers, the organic food community, email listservs, online newsletters, newspapers, food magazines, National Public Radio, government sources, and documentaries.

Stephanie said that she primarily uses her “textbooks and teachers” to stay informed. Similarly, Tony stays informed about the debate “through my community, through my parents, through school, and through my personal relationships.” Ann said, “I read primary literature, books that come out, and I listen National Public Radio.” Veronica uses a variety sources to stay informed and engaged in the debate:

Internet, I surf Powells [local bookstore] all the time, meaning there and on the internet for literature. I belong to a research team, that’s an urban agriculture

research team and we meet weekly and discuss readings and, we've actually created a web environment for sharing our research, so some people are interested in genetically modified food in that research group. I also keep track of the news, *The New York Times* has actually a pretty good news feed, and that's nice to kind of get a pulse of the U.S., and I also refer to BBC [British Broadcasting Corporation] news just to know what's going on in the European market, because they early on decided that genetically modified foods are something they don't want to have in the landscape, so I'm interested. If I want to know what's going on there then I have to go to their news source.

Two common themes emerged when the participants discussed seeking information and informational sources: seeking information to become a resource, and source credibility.

### **Seeking information to become a resource.**

Several of the participants felt a need to stay informed on the GM debate so they could be a resource to the people in their professional and social circles. For example, Veronica said she uses various sources (newsletters, listservs, books, classes, and colleagues) to stay informed because she wants to “understand the politics and help with disseminating the information.” Similarly, Jennifer shares that, “I’m really into reading, so I like to read about it... I’m constantly researching it and looking into it and finding ways for me to live my life as an educator in it, so I have to be constantly

on top of it.” Charlie also wanted to stay informed about the genetically modified food debate so he could be a resource for people who visit the Learning Garden Laboratory. “My job is to interpret scientific papers and data and make that accessible to the average gardeners, so I use university and government sources for my information.”

The desire to stay informed about the genetically modified food debate for the purpose of being a resource to others seemed to reaffirm that these participants viewed themselves as opinion leaders.

### **Source credibility.**

Some of the participants mentioned source credibility as a factor that influences what sources they use to stay informed in the genetically modified food debate. For example, Charlie was skeptical of the research that has been reported on genetically modified foods. He said, “The research that’s being done has been paid for by the companies themselves, and I find that less credible.” Stephanie also mentioned that she avoided using websites. “I try to stick to the facts as much as possible, websites are kind of emotional...there is a lot of really bad information basically, and they’re [websites] not required to go through any kind of editing process that I know of.” Similarly, Ann discussed her frustration with source credibility when attending some talks and lectures on genetically modified food:

Sometimes I hear people and I don’t even know what they’re talking about, and it’s basically scare tactics and people are eating it up, and it’s really

frustrating because I feel like if you don't have a background in science or have critical thinking skills, you're just going to absorb all of that. And I almost think that's more detrimental to the movement because they're like, you know, pushing off like false information that's easily refuted.

In summary, all of the participants used media sources to stay informed with the genetically modified food debate, and many of the participants were concerned about source credibility. Some participants relied on their social network for trustworthy information. Finally, some of the participants appeared to have a desire to stay informed on the genetically modified food debate so they could be a resource to others, which reaffirmed their role as opinion leaders.

### **Opinions about Genetically Modified Foods**

The current study's aim is to understand public opinion formation by determining what factors influence opinion leaders to engage in the genetically modified food debate, and how opinion leaders describe American lay publics' engagement in the debate. To address opinion formation I asked my participants to share their opinions about genetically modified foods. I also wanted to see if the participants' opinions were solidified to determine if they could disseminate information and model behaviors to the people with whom they are influential. Recall that the literature suggests that opinions are not fully formed until individuals make behavioral adjustments (Davison, 1958).



**Opinion.**

All of the participants expressed some level of concern about genetically modified foods and how the technology affects people and the environment. Three patterns emerged when the participants shared their opinions about GM foods: feeding the world, corporate control, and environmental concerns. However, it is important to note that there was some overlap between these categories.

***Feeding the world.***

Some participants addressed the issue of feeding the world. Charlie stated, “Well, gosh, we have a lot of people to feed, and if we’re engineering organisms of plants to be more drought or salt resistant...it seem like some potentially valuable inventions.” However, Charlie believed that traditional farming is a safer alternative. “Through traditional crop breeding we can in many cases create the varieties that we want, it takes a longer period of time, and I would say that there’s a whole lot less risk associated with that.” Stephanie made a similar argument:

The science behind it is done in order to create more food for starving people, and in some very specific instances that’s working. In a lot of instances I think it’s causing a problem...if we’re relying on one kind of food, which is what happens when you get one big company having one kind of food, and if something goes wrong with that food it’s a big problem.

Veronica discussed her concerns about genetically modified food and the notion of feeding the world. “I’m not sure that in our food system that’s where it [genetic modification] belongs, especially for profit. It just drives me crazy that we’re doing this, and I think it’s under the false premise that we can feed the world, when in fact we’re not.” Ann also questions the motives behind feeding the world:

A lot of what chemical companies and the large science companies say is that we need genetically engineered foods to feed the world, but there is so much food waste in the world right now already, there’s a lack of distribution, a lack of access, so there’s not a lack of food, you know, and the companies that are promoting that as their reason, they are the sole beneficiaries of everybody adopting that.

### ***Corporate control.***

Many of the participants discussed corporate influence and corporate control over seeds and farming. Jennifer shared her fears about genetically modified seeds. “I’m scared that there’s so much corporate control over seed, I think seed sovereignty is going to make or break our society in a lot of ways, and it has for so long.” Similarly, Kristin voiced her concerns about the intellectual property rights associated with genetically modified seeds. “I see problems with intellectual property rights and those sorts of issues...big companies sort of take ownership of the patent on the seeds and are suing farmers and trying to out compete farmers in that way.” Therefore,

corporate control, seed patenting, and legal issues appear to be concerns for some of the participants.

### *Environmental concerns.*

Many of the participants also mentioned environmental concerns with genetically modified seeds. Specifically, Tony discussed soil erosion. “We’re talking about erosion, soil erosion, and depletion of minerals without compensation. Fields that would have lasted a couple of hundred of years without going through an erosion process are now going to do it in a couple of decades.” Jennifer expressed concerns about the chemicals that are used with genetically modified seeds. “People are wearing gas masks when they are spraying chemicals that are made for modified seeds. I mean, if someone is wearing any sort of suit to manage our fields, obviously something is wrong.” Stephanie and Veronica mentioned seed diversity as a primary concern. Veronica said, “I think the alarming aspect of all of this is the lack of diversity in seed that is available, and that so much of that diversity of seed is being lessened and GMO seeds are being sort of imposed on the landscape.” Similarly, Stephanie discussed the presence of genetically modified soy and corn in American farming:

We’re really dependent on GM foods in some ways right now and in the United States actually with soy and corn, and they’re new, and we don’t know how great they are for us or if they’re going to keep breeding with other plants

within their own species and if it cycles species poorly we're going to create more of a monoculture and lose a lot of diversity through that.

## **Behavior Change**

I also wanted to see if the participants' opinions were solidified to determine if they could be a resource and model behaviors to the people with whom they are influential. Recall that the literature suggests that opinions are not fully formed until individuals make behavioral adjustments (Davison, 1958). All of the participants said they changed their behavior after learning about genetically modified foods, which provides evidence that their opinions have moved towards crystallization. All of the participants avoided consuming or purchasing genetically modified foods. Other behavior changes included: growing food, buying locally grown food, buying organic food, investing in Community Supported Agriculture, buying food from farmer's markets, reading labels, avoiding processed foods, cooking at home, and using food diaries. Jennifer said, "I grow my own food." Kristin buys her food locally. "I do a lot of purchasing from local farmers, and eat a lot of fruits and vegetables in general and I try not to eat a lot of processed foods that have a lot of unknown ingredients in them." Ann used a variety of techniques to avoid GM foods:

The only way you can really avoid it [genetically modified foods], not even 100% is to buy exclusively organic foods, so, I mean, that's what I do...I don't eat a lot of processed foods, so that really significantly reduces your exposure

if you're not drinking soda filled with corn syrup, and I cook most of my food at home so I know exactly what's going into it, when I can I grow most of my own food.

In summary, all of the participants voiced concerns about genetically modified foods. The participants primarily discussed the issue of feeding the world, the corporate impact of genetically modified seeds, and the environmental impact of genetically modified seeds. In addition, all of the participants made behavioral adjustments to avoid consuming genetically modified foods, which suggests that the participants' opinions have moved towards crystallization.

### **Perceptions of American Publics' Engagement with Genetically Modified Foods**

Recall that Research Question 2 asks, *How do opinion leaders describe the level of engagement with the genetically modified food debate on the part of general (lay) American Publics?* First, I was interested to see what the participants thought about regional engagement with the GM debate, specifically in Portland. I was curious to see how the participants described local engagement. Would it differ from how they described national engagement?

Many of the participants felt that Portland is a progressive city where many people are engaging in the debate. For example, Jennifer said, "This is like a very progressive city, it's part of the culture like food is a huge part of what Portland is becoming." Similarly, Veronica shared, "I think it's [Portland] an island of liberalism

and progressive thinking.” Stephanie also shared, “I think that Portland is probably the current place that people are more informed than a lot of different places, and it’s really easy to avoid GM food here.” Kristin agreed, “I think Portland tends to be a place where people are pretty aware of these issues, so I think people are pretty open to talking about those types of things.” However, Tony also noticed that other areas and regions are getting involved, too. “There are a lot of people attracted to living in this area [Portland] because of having similar mindsets and wanting to address these issues, but I’m finding through traveling, no matter where I go, that there are a significant number of people who are interested in this topic.” Charlie had a different perception of Portland’s involvement in the GM debate. “I want to try to have a rational approach to the issues and to think about all of the issues so that I can make that clear to our pretty broad range of cliental, rather than just jumping to conclusions as seems to be the case in Portland around food issues.”

In summary, the majority of the participants believed that Portland is a progressive community that is engaging in the genetically modified food debate. Most of the participants noticed that the Portland community tends to be informed about genetically modified food issues and is willing to having discussions about them.

### **American Engagement in the Genetically Modified Food Debate**

Recall that the literature suggests that many Americans are somewhat ambivalent and uninformed about genetically modified foods (Hallman & Hebden, 2005). Therefore, I was interested to see what the participants’ perceptions were about

the American public's engagement with the genetically modified food debate.

Research Question 2 asks, *How do opinion leaders describe the level of engagement with the genetically modified food debate on the part of general (lay) American Publics?* All of the participants felt that many Americans had a lack of interest in genetically modified foods, and all but one participant felt that general publics do not know what genetically modified foods are. I noticed three patterns emerged when the participants discussed American publics' engagement with the genetically modified food debate: disconnection, economic hardship, and American culture.

### **Disconnect.**

Several of the participants talked about how many people are somewhat removed from their food and its growing process. For example, Tony mentioned that, "Sometimes I'll have a kid come into the farm and ask where the corn-nut tree is." Similarly, Ann shared, "Growing up on a farm everybody knows where their food comes from, but I am constantly surprised in the city where people don't know that potatoes grow underground; they don't know what broccoli looks like growing, and they think strawberries grow on trees, that sort of thing." Jennifer also remarked, "People just have no idea where their food comes from, like they think broccoli just comes from the store, they don't know that it grows on a stock, or they don't know that persimmons are from a tree, or that your greens are growing from the ground." Kristen talked about how many people don't think about their food. "People don't

really think a lot about where their food comes from, or how it's treated, or, you know, people in this culture are just use to fast food and highly processed food."

### **Economic hardship.**

Another commonly mentioned reason for Americans' lack of engagement in genetically modified food debate was economic struggles. For example, Kristin said, "Obviously lower income people are kind of dealing with sort of everyday issues with food insecurity and just being able to eat is more important...they don't gain access to information about genetically modified food; it's not really on their radar." Similarly, Ann noted, "People are busy, a lot of people are just trying to make ends meet."

Veronica also discussed economic struggles:

When people are economically struggling, how can they focus on what they eat, you know?...They are going to fall back on that junk food and that food isn't good for them, so that's going to keep awareness levels down, I think, just because you can't go there, you don't have time, you're too busy surviving.

### **American culture.**

Some participants said "American culture" is hindering people from actively engaging in the genetically modified food debate and other food related issues. For example, Ann discussed how Americans are concerned about getting their food at lower prices. "I think a lot of times people are mostly concerned about getting cheap food. I think for a lot of people that's their primary concern, as long as it's cheap



they'll worry about the environmental or personal health stuff later." Charlie talked about how Americans tend to be consumed with their daily lives, which affects their ability to engage in the genetically modified food debate:

Well, it seems like many Americans just don't seem to be concerned about anything, really. They're just going along with the flow, and kind of in survival mode and not necessarily analyzing what's going on around them for a variety of reasons...television, lack of interest, and people just sort of struggling day-to-day in their lives, and no one's really thinking too much about the big picture.

Similarly, Tony discussed how many Americans value convenience, which he believed affects many Americans' willingness to engage in the GM debate:

It's such a convenient life that we live. I mean, really, why would you seek out knowledge about something that isn't really harming you?...They go to a fast food restaurant, there's no instantaneous problem with that...people are complacent about their food because it's convenient.

In summary, all of the participants felt that the majority of Americans had a lack of interest in genetically modified foods, and felt that many Americans do not know what genetically modified foods are.

## Emerging Public Interests

Several of the participants talked about how food issues have become more popular in recent years, which has helped increase awareness around genetically modified foods and other food issues. For example, Veronica shared, “I do think the public is far more aware than they were five to ten years ago...it’s just starting to sink in, the awareness level, which is a good thing.” Kristin also discussed recent public interest around food issues: “Food issues are becoming more of, I guess average, or they’re kind of getting into mainstream society more with people, you know, creating more mainstream media outlets about food systems, so like *Food Inc.*, [a documentary released in 2009 that addresses issues surrounding America’s industrialized food system] you know, things like that which have come out more recently.” Similarly, Veronica shared, “I mean there has been many films in five years, documentaries that are out there, you know, Michael Pollan, I mean how many books has he written in five years, maybe three, the guy is amazing!” Jennifer also discussed the recent success of books that address food issues:

I think a lot of books have become very popularized like Michael Pollan is like a common name now, but no one even knew about *The Botany of Desire*, you know, before hand it was like eight years ago when it first came out and now it’s like *The Omnivore’s Dilemma* and like *The Ethics of What We Eat* by Peter Singer, or, you know, things like that.

However, Tony had a slightly different perspective on the films and books that have been recently released:

You know these movies and books come out and they talk about the problems... and they [books, films, programs] are a really good way to get people initially interested in these issues with genetically modified foods, but I don't think that they leave any lasting impression. I don't think that a film is really designed to leave a lasting impression or even a book. They're a great reference, but, you know, life is what creates a lasting impression, it's what's being influenced by educators, by parents, by community members that really impacts people and what happens to the land.

Even though the majority of the participants felt that most Americans are not engaging in the genetically modified food debate, many participants noted the recent success of films and books that address food issues as evidence of a shift in public awareness. However, some of the participants question if films and books will have a lasting impact on awareness and engagement.

## **Suggestions on How to Motivate Americans to Engage in the Genetically Modified Food Debate**

Recall that the literature suggests that many Americans are somewhat ambivalent and uninformed about genetically modified foods (Hallman & Hebden, 2005). Therefore, I wanted to ask the participants about their thoughts about how to increase public engagement with genetically modified foods to see if there are additional ways to increase engagement. Some of the methods mentioned were: teach it in schools (in both K-12 and college levels), open more facilities like the Learning Garden Laboratory so people can reconnect with their food, create informational pamphlets that explore both sides of the issue, do more research on the topic, and produce more media coverage (films, books, local news, etc.).

However, the most commonly mentioned way to increase engagement with the genetically modified food debate was to introduce people to the issues at school. Ann said, “Some sort of educational outreach either at high school or college level, you’re not trying to brainwash people or try to convince them of something, but just to like tell them like what’s out there and show them, you know, what’s going on.” Kristen and Tony suggested reaching out to the younger students. Kristen said, “Talking to younger populations of students about it, and of course teaching where their food comes from...what are the effects and sort of the pros and cons of all those different things that come up with genetically modified food.” Tony believed that teaching young people about food issues will help inform their families too. “I mean through students is a really good way to get through to families too because, umm, you know,

all parents are concerned with their children's health...you see students come in and say, 'I've convinced my mom to plant a garden in the backyard this year,' you know."

Some of the participants discussed the importance of educating people about food issues and why it is crucial for people to build a relationship with their food. For example, Tony said, "Once people understand and become aware of their food systems and how it impacts their health and their diet and that responds to their creative minds, there really is no turning back point." Similarly, Kristin said, "People can make connections with how food is grown and the differences between a fresh vegetable versus something that has been shipped or, you know, some type of storage, letting people experience things for themselves in a hands-on kind of way...It's the most important part of it." Tony discussed how quickly people can become engaged in food issues and the genetically modified food debate:

It's interesting to me how quickly through the education process, through garden based education how quickly they become aware of their surroundings, how fast this happens, within weeks at times, and then how after that occurs how passionate these people become...the people most dependent on genetically modified foods often times quickly become the ones who are most passionate and aware of it so quickly.

In summary, the participants recommended educating students (from elementary to college level) about genetically modified foods. In addition, some of the

participants identified the importance of introducing people to food systems and gardening as a way to increase engagement in the genetically modified food debate.

## **Chapter 7: Discussion and Conclusion**

The current study focused on public opinion formation by determining what factors influence opinion leaders in the organic food community to engage in the genetically modified food debate, and how opinion leaders describe American lay publics' engagement in the debate. The findings suggest that opinion leaders in the organic food community engage in the debate by seeking out new information on the topic, having discussions with others about genetically modified foods, and critically thinking about genetically modified food issues, which support Davison (1958), Katz (1957), and Rogers' (2003) theoretical discussion of opinion leadership behaviors.

The participants did demonstrate opinion leadership behaviors in relation to genetically modified foods. However, a somewhat unexpected finding emerged. The participants appeared to be opinion leaders in broader food issues where genetically modified foods were just one component of their opinion leadership. For example, many of the participants repeatedly discussed their interests and involvement with organic gardening, sustainability, and food systems, to which genetically modified foods appeared to be a secondary component. The findings indicate that opinion leadership does not necessarily need to be linked to one single issue. Much of the opinion leadership literature addresses leadership in relation to one product, one issue, or one innovation, but has yet to explore opinion leadership of larger interlinking topics. Are opinion leaders of broader topics more influential because they have a greater understanding of interconnected issues, or are they less influential because their interests are more diverse and less singularly focused? Future studies could

attempt to address issues surrounding opinion leadership of broad and interconnected topics.

The current study has provided insights into opinion leadership and engagement in the genetically modified food debate. Much of the existing literature on opinion leadership has focused on opinion leader characteristics and how opinion leaders communicate. However, much less effort has been aimed at identifying the motives that foster opinion leadership (Richins & Root-Shaffer, 1988). The current study expands the understanding of why opinion leaders become involved in issues and enact opinion leadership behaviors. The findings suggest that opinion leaders became involved in the genetically modified food debate for different reasons, but in all cases the participants began their involvement based on personal connections to the issues. Some of the participants changed their diets and became involved, others had children and were concerned about their dietary needs, others developed a passion for these issues once they decided they wanted to be educators, while some began to engage because they had environmental concerns. The findings suggest that engaging in opinion leadership behaviors takes more than an interest in a topic: it also requires a personal connection or motivation for becoming involved. In addition, the participants are members of an organic food teaching facility where several of the participants educate people about sustainability, organic principles, and gardening practices. Many of the participants expressed a desire to stay informed about the genetically modified debate so they can be a resource to people at the Learning Garden Laboratory and to members of their social network. Therefore, it appears that the participants' role as



educators is another component that contributes to their engagement in opinion leadership behaviors.

In terms of American lay publics' engagement with the genetically modified food debate, my findings suggest that opinion leaders perceive lay publics as uninformed and disengaged with the genetically modified food debate, which is consistent with previous studies reporting on Americans' involvement with genetically modified foods (Hallman & Hebden, 2005; Hallman & Aquino, 2005). In addition, the participants frequently linked "public disconnect" from food as a barrier that affects public engagement with genetically modified foods, which shows support for Hebden, Shin, and Hallman's (2005) notion that many Americans are disconnected from agriculture and food because farms and farming land are set apart both physically and psychologically from urban centers where most of the population lives. More specifically, the current study's findings suggest that Americans are removed from the overall food growing process. For example, several of the participants discussed how they have come across people who could hardly identify a fruit or vegetable, much less how it takes root and grows. In addition, the participants also noted that the average American's relationship with his or her food begins at the grocery store or restaurant where they purchase it, which suggests that many consumers do not know who grew their food, where their food was grown, what their food looks like when it is growing, and do not know about the process their food goes through before it arrives at the grocery store or on their dinner plate. The findings suggest that disconnection

from food is one of the primary barriers affecting American engagement in the genetically modified food debate.

Europeans, on the other hand, have been more active in the GM debate. Why are Europeans engaging in the debate while Americans are not? A recent study found that many Europeans believed that GM foods were risky, not useful, and should not be encouraged (Gaskell, Einsiedel, Priest, Ten Eyck, Allum & Torgersen, 2001), and some researchers suggested that “negative public opinion about GM crops and food is largely the product of several widely-publicized food safety scares in the mid 1990s that have made Europeans consumers extremely wary of changes to the food supply” (Pew Initiative on Food and Biotechnology, 2005, p. 11). In addition, Europeans seem to have a deeper connection to their food than most Americans. For example, some researchers have suggested that Europeans are more connected to farming and food production because European farms tend to be smaller and situated closer to population centers (Hebden Shin & Hallman, 2005). Others have suggested that Europeans tend to have a stronger relationship with their food because their cuisines tend to be based on traditional foods connected with regional practices (Pew Initiative on Food and Biotechnology, 2005).

Another important difference between Americans and Europeans is how food is purchased. For example, corporate supermarkets have not overtaken local grocers and food producers (bakers, butchers, dairies, etc.) in much of Europe, whereas the majority of Americans tend to buy their food from corporate supermarkets where

produce and food products are shipped in nationally and internationally (Pew Initiative on Food and Biotechnology, 2005).

Americans appear to be uninformed and disengaged with the GM debate. However, the rBST milk exemplar demonstrated that American publics will engage in food issues and form opinions when they have an increased interest and access to information. Therefore, it seems likely that Americans will engage in the GM debate if they are interested and informed about these issues. So, how do we increase American publics' engagement in the genetically modified food debate? The participants in this study recommended several ways to increase engagement. The most commonly mentioned method was to incorporate these issues in academic curricula (from elementary to college levels), which was somewhat unexpected. The literature on public awareness of genetically modified foods does not discuss education, especially focused towards youth, as a possible option to increase knowledge and understanding of genetically modified food issues. It appears that youth tend to hold little power and are often overlooked as problem solvers within our society. However, educational programs geared towards young people may promote dialogue within families and possibly communities, which could increase public engagement with genetically modified foods. Therefore, some youth are potential opinion leaders in the genetically modified food debate, and should have access to information surrounding these issues.

The emergence of education was also somewhat unexpected finding because the opinion formation and the opinion leadership literature do not directly outline education as an avenue for information and opinion formation. However, educational

institutions are places for people to access information, explore multiple sides of the debate, and can provide a safe place to have discussions and form opinions about genetically modified foods. Perhaps academic institutions and educational facilities are components of opinion formation. Future studies should explore these relationships to determine if educational institutions have an impact on opinion formation and opinion leadership.

The findings from the current study suggest that implementing curricula in schools that address genetically modified foods, and opening more teaching facilities like the Learning Garden Laboratory across the nation, are paramount in addressing Americans' disconnect from their food and our disengagement with the genetically modified food debate. However, enacting change is a slow process especially when change involves the education system. Many schools are underfunded and have limited resources to create new curricula and build interactive gardens. This could be a slow process, but yet a worthwhile effort.

Other potential ways to enact change and increase engagement outside of educational facilities are to build community gardens, open farmer's markets, and open and develop local grocery stores that sell local produce and goods. Such businesses promote community involvement and are avenues for connecting, discussing, forming opinions, and engaging in the genetically modified food debate.

## Limitations

Several limitations related to this research need mention. First, the study utilized a convenient sampling method that is not generalizable to the population of interest. In addition, the author sought out participants who were informed and engaged in the genetically modified food debate, so it is doubtful that less active organic food community members would be as engaged or interested in genetically modified foods as the participants in this study.

Second, this study was conducted in Portland, Oregon: a city that the research participants described as progressive, aware of food issues, and willing to discuss genetically modified foods. Therefore, it would be illuminating to conduct similar studies in other regions where food issues are less prominent.

The current study also looked at an organic food teaching facility where the main focus is on education. Therefore, it might be beneficial to do more research with organic farmers, either in Portland or other areas, whose livelihoods depend on selling their crops to see if their opinions, experiences, and perspectives differ from the views presented in this study. It would also be valuable to look at large crop producing farming communities throughout the country to see if levels of engagement in the genetically modified food debate differ.

Finally, this study focused on the organic food community as a population of interest because the literature suggested that this community actively resists genetically modified foods (Lyons, Lockie & Lawrence, 2004), so I assumed that this community would be more engaged in the debate compared to other lay publics.

However, there are other publics that have a stake in the debate, specifically, farmers who use genetically modified seeds. It might be beneficial to conduct a similar study with this community to explore how their engagement in the debate might differ from the view presented in the current study.

### **Future Studies**

Future studies could expand the current work to address the motives that promote opinion leadership behaviors. To my knowledge, most studies that examine opinion leadership motives are rooted in market research. It could be useful to conduct additional studies that focus on social issues to determine if opinion leadership motives differ between social issues and merchandise.

The current study also addresses unique issues surrounding American publics' engagement in the genetically modified food debate. Much of the existing work has focused on Americans' opinions and understanding of these issues or media coverage of these issues. To my knowledge, no studies have attempted to uncover why interested publics engage in the GM debate. By studying why some people engage in the GM debate, it can help illuminate why some groups are involved, and uncover the barriers that affect engagement. Additional work still needs to be done to gain more clarity.

Finally, the findings from the current study suggest that education is an important component of opinion formation. Future studies could examine the

relationship between opinion formation and educational institutions to determine to what degree academics impact opinion formation and opinion leadership.

## **Conclusion**

The findings of this research indicate that some members of the organic food community are opinion leaders because they have an increased interest in food issues and genetically modified foods, seek out information on these topics, and engage in discussions with others about these issues. The opinion leaders in the current study became involved in the genetically modified food debate for different reasons, but in all cases the participants began their involvement based on personal connections to the issues. The findings suggest that engaging in opinion leadership behaviors takes more than an interest in a topic, but rather a personal connection or motivation for becoming involved.

The current study also provided some insights on the barriers affecting American publics' engagement in the genetically modified food debate. Disconnect from food appears to be one of the primary barriers affecting opinion formation and engagement in the genetically modified food debate. However, the findings indicate that American engagement could increase if we incorporate these issues into academic curricula, and develop more educational facilities that promote garden based education where people can begin to connect with their food and form opinions about these issues.

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## Appendix A

Human Subjects Research Review Committee  
Post Office Box 751  
Portland, Oregon 97207-0751  
hsrrc@lists.pdx.edu

503-725-4288 tel  
503-725-3416 fax

October 22, 2009

To: Celeste Moser  
From: Nancy Koroloff, HSRRC Chair

Re: Approval of your application titled, "A Qualitative Study of Public Opinion and Public Engagement with Genetically Modified Food" (HSRRC Proposal # 091107).

Dear Celeste,

In accordance with your request, the Human Subjects Research Review Committee has reviewed your proposal referenced above for compliance with DHHS policies and regulations covering the protection of human subjects. The committee is satisfied that your provisions for protecting the rights and welfare of all subjects participating in the research are adequate, and your project is approved. Please note the following requirements:

**Changes to Protocol:** Any changes in the proposed study, whether to procedures, survey instruments, consent forms or cover letters, must be outlined and submitted to the Chair of the HSRRC immediately. The proposed changes cannot be implemented before they have been reviewed and approved by the Committee.

**Continuing Review:** *This approval will expire on October 22, 2010.* It is the investigator's responsibility to ensure that a Continuing Review Report (available in ORSP) of the status of the project is submitted to the HSRRC two months before the expiration date, and that approval of the study is kept current.

**Adverse Reactions:** If any adverse reactions occur as a result of this study, you are required to notify the Chair of the HSRRC immediately. If the problem is serious, approval may be withdrawn pending an investigation by the Committee.

**Completion of Study:** Please notify the Chair of the Human Subjects Research Review Committee (campus mail code ORSP) as soon as your research has been completed. Study records, including protocols and signed consent forms for each participant, must be kept by the investigator in a secure location for three years following completion of the study. If you have questions or concerns, please contact the HSRRC in the Office of Research and Sponsored Projects (ORSP), (503) 725-4288, 6th Floor, Unitus Building, 4th & Lincoln. Approval of your application titled, "A Qualitative Study of Public Opinion and Public Engagement with Genetically Modified Food" (HSRRC Proposal # 091107).

Cc: Cynthia Coleman

## **Appendix B**

### **Interview Questions**

1. What is your position at the Learning Garden Laboratory? How long?
2. Why is it important for you to work/volunteer at the LGL?
3. How did you first become interested in GM food? Do you remember the first time heard about GM food?
4. How knowledgeable do you feel about GM food?
5. How do you define GM food?
6. What's your opinion about GM food?
7. Do you think there is a controversy around GM food?
8. Do you remember if there was a turning point or anything that really influenced you after hearing about GM food?
9. How is your life affected by the presence of GM food? Has anything changed?
10. What informational sources do you use to stay informed about GM food? Why do you choose to use these sources?

11. Are there informational sources that you have come across that you choose not to use to stay informed about GM food? Why?
12. Do you think living in Portland affects the way you think about GM food? Why?
13. Are there other areas about GM food you would like to know more about?
14. Do you discuss GM food with others? Can you think of anyone else? About how often?
15. Do people come to you to get information or talk to you about GM food?
16. Do you think the average American understands what GM food is? Why or why not?
17. According to national opinion polls Americans are uninformed about GM food. Why do you think they're uninformed?
18. What do you think is the best way to inform people about GM food?



**Appendix C****Code Sheet****Date:** \_\_\_\_\_**Interviewee (Pseudonym):** \_\_\_\_\_

**Code 1: Opinion Leadership Behaviors** (highlight red)  
Reference to interest, seeking information,  
knowledge, and discussions with others regarding  
genetically modified foods.

**Notes:**

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**Code 2: Engaging in the GM Debate** (highlight yellow)  
Reference to informational sources used to stay  
current on the debate.

**Notes:**

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**Code 3: Opinion Formation** (highlight green)

Reference to learning about genetically modified foods, expressing one's opinion, changing one's behavior.

**Notes:**


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**Code 4: Portland, Oregon** (highlight purple)

Reference to living in Portland, Oregon.

**Notes:**


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**Code 5a: Americans' Engagement with Genetically Modified Foods**  
(highlight pink)

Reference to Americans' engagement in the debate, and recent public interest in food issues.

**Notes:**


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**Code 5b: Increase Americans' Engagement** (highlight orange)

Recommendations on how to increase Americans' awareness, understanding, and engagement with the GM debate.

**Notes:**


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## Appendix D

### Excerpt of “Tony’s” Interview

CM: “Okay, how knowledgeable do you feel about genetically modified food?”

P1: “Not very knowledgeable. I’m becoming fairly knowledgeable on non-genetically modified foods, but, umm, yeah, I’ve researched it a small amount, and I definitely seen the yield of genetically modified product, but as far as know the process to knowing the science of going into it I’m very ignorant, and I would like to say that, to be honest.”

CM: “Yeah, totally okay. Umm, and I just want to give you an opportunity to provide a definition for how you define genetically modified foods. It’s not like a test question or anything. It’s how you kind of define it for yourself.”

P1: “Umm, in the Jared Diamond’s book ‘Guns, Germs, and Steel’ he goes into detail about how, ahh, even though we’re not doing it scientifically all food that has been domesticated is modified in some sense. And, although we’re not necessarily scientifically changing the composition, what we’re basically doing is, when we find the crop that is eatable for some reason, and that we like it, we try to find the largest ones and we cultivate them, and we find the larger ones out of that yield and cultivate those again, and you know, that’s where we get our modified crops. So, even the trees and the plants that we’re growing organically right now, have been modified, and could be considered genetically modified, even though it’s not though a scientific process necessarily, it was done more through experimenting. Umm, so, I think what, when we’re referring to the term genetically modified foods we’re less talking about that, and more talking about modern science, laboratories, splicing genes, and artificially creating a better product instantaneously, but really if time is not the variable in that equation, than the two processes are pretty similar. And, umm, I think that even with the crops that we’re growing that have gone through that evolutionarily process, umm there still are consequences because our earth, our land, and our soil isn’t prepared to grow, or hasn’t adapted to, umm, the produce and the trees that we have even evolved, umm, through traditional methods of, umm, genetically modifying them.”

CM: “Yeah, great, thank you. And, umm, I just want to give you an opportunity to tell me about your opinion, your overall opinion about genetically modified food.”

P1: “Well, umm, you know, it’s hard for me to really be hypocritical about that question because, you know, unconscious and subconsciously, and to a certain point in my life consciously I accepted them, and it wasn’t until my adulthood that I actually challenged their existence. And now, now working on methods locally that you can,

umm, work without, not really working against, working without, I don't think at this point we're organized enough to work against it. Umm, I lost my train of thought on that one (laugh)."

CM: "That's okay. Umm, just getting back to that question, if you wanted to add anything more, just about your overall opinion."

P1: "Yeah, okay."

CM: "But if that was it, we can move on too."

P1: "I think that was a good segue."

CM: "Okay, great. (laugh) Umm, and do you think that there is a controversy around genetically modified foods?"

P1: "Yes."

CM: "What do you think that is?"

P1: "Umm, there's a, the controversy I see is between land and human existence. I don't think that is really, umm, the popular controversy, but I think that's the most pressing one that, you know, in, when you have genetically modified corn growing in the fields in Iowa. Umm, you know, we're talking about erosion, soil erosion, and depletion of minerals without compensation, that fields that would have lasted a couple of hundred of years without going through an erosion process are now going to do it in a couple of decades."

## Appendix E

### Excerpt of “Jennifer’s” Interview

CM: “Are there other areas about genetically modified foods that you want to know more about?”

P2: “I would like, it would be really cool to have, I think, like information pamphlets or something, just when you’re first, umm, integrating some of these ideas and moral and ethical foundations to people. Like just like a timeline, like this is when, you know, the Green Revolution started and in theory this is what it was and in fact this is what was happening, this is how it was practiced. And just have some sort of visual timeline, umm, and information booklet or something like that. I think that would really help for me, and I think it would really help for those especially those who like maybe don’t speak this language so you could talk about it, but like having something hands-on.”

CM: “Yeah.”

P2: “Information sessions I was even thinking, umm, integrating into like into the food pyramid and into the education like in the public school system, I think would be amazing, umm, which is directly correlated with garden based education and looking at foods, we talk about that. We’ll talk about the history of corn and it will evolve to like let’s start looking at the labels, like what’s in our food, like what does this mean, and having that earlier than later in the education.”

CM: “Yeah. Great, thank you. Do you discuss genetically modified foods with others? Is it like a point of conversation for you with your circle?”

P2: “Yeah, I mean absolutely I think food politics are very much a norm with a lot of my friends, and it’s really cool, it’s across genders too. I think I almost talk about it more with my male friends than I do with my female friends, which I think historically wouldn’t have been the case, it’s like women cook and men don’t, you know? Umm, as far as gender roles go, but yeah it’s definitely, umm, I mean it’s my livelihood, it’s like what I do, it’s what I want to bring to the masses. So yeah it’s definitely part of daily discussions and educating your family about it and your friends and making sure everyone is on the same page and is understanding where their food comes from.”

CM: “Okay, great. And do people come to you to get information about genetically modified foods, or we can expand it to like food in general? Like do they ask you questions or if they are confused about something do they come to you?”

P2: “Yeah, and I think it’s just in the last, you know, seven years I have just been so interested in it and making it a part of like, I guess not only food but just getting back

to like nature and back to the basics of how to survive, like survival skills and things like that, and so that's kind of, umm, it has evolved in more of a relationship with food. And yeah I mean my friends call me about, you know, if it's growing food, it's what do you know about this fertilizer, what don't you know like, 'what if I got up,' 'how do I know if it's genetically modified or not,' you know those things are definitely questions that I'm asked a lot. And when you're working with inquiring minds and younger students they're going to ask all those basic questions without even coming like, 'what is genetically modified,' they're just asking every other question but that, and that's empowering, so."

CM: "Yes, great, thank you. And in your conversations with others what do you think they want to know more about, or what are areas of interest that you've kind of come across in your conversations with people?"

P2: "More people wanting to grow food. More within the last year because such like a buzz word, you know, and a buzz topic, but yeah I mean I have friends calling all the time like, 'can you help me set up a garden,' 'like what do you think,' or, 'I'm just going to live off the land this year,' you know? I mean you have like Kingsolver's book, and you have like Tom Robbins, umm, Tom Robbins, yeah of the Robbins family, not (laugh). Umm, and I think a lot of those books have become very popularized like Michael Pollan is like a common name now, umm, but no one even knew about *The Botany of Desire*, you know, before hand it was like eight years ago when it first came out and now it's like *The Omnivore's Dilemma* and like *The Ethics of What We Eat* by Singer, or, you know, things like that. I mean, yes that has tons to do with it because people are really like fighting for these ideas to be at the forefront of our discussions in policy and health, and so I think our intellectual ancestors have had tons to do with that in literature."

## Appendix F

### Excerpt of “Stephanie’s” Interview

CM: “Great, thanks. And what’s your opinion about genetically modified food?”

P3: “I think that a lot of research needs to be done on it before we, I guess before we eat them. I have a lot of mixed emotions about them because on the one hand they, umm, the science behind it is done in order to create more food for starving people, and in some very specific instances that’s working. In a lot of instances I think it’s causing a problem, but on the other hand all mass production kind of causes a problem, it’s not really stamped out for individuals in small villages, it’s stamped out for every village which means it causes problems in every village, it’s not helping their own production, it’s trying to get them to conform. It can be really destructive and, because we don’t know what’s going to happen with mutations and the kind of genome that has a new gene in it. And we don’t know what’s going to happen with corn breeding with other maize plants in the wild with its new, like the amphibian gene, and we don’t know what’s going to happen if that gene mutates and starts to affect plants compounds that become toxic. Plants are good at making toxic compounds and animals aren’t that good at doing that. I mean this is all like a big fantasy, kind of, but we don’t know what’s going to happen, and if we’re relying on one kind of food, which is what happens when you get one big company having one kind of food, umm, and if something goes wrong with that food it’s a big problem. We’re really dependent on GM foods in some ways right now and in the United States actually with soy and corn, umm, and they’re new, and we don’t know how great they are for us or if they’re going to keep, you know, breeding with other plants within their own species and if it cycles species poorly we’re going to create more of a monoculture and lose a lot of diversity through that.”

CM: “And you mentioned toxic compounds, I’m not familiar with that term, can you tell me what that means?”

P3: “Umm, plants are good at making compounds that make their seeds or their leaves hard to digest because animals eat the plants all the time, so toxic would probably be like hard to digest, unpalatable, or even like a cause for death to like, umm, a lot of bugs are beneficial, and people don’t understand that necessarily, everybody doesn’t understand that necessarily that killing off bugs, plants that can kill off bugs is not necessarily a good thing.”

CM: “Right, okay, thank you. Do you think there’s a controversy around genetically modified foods?”

P3: “I do, but I think the majority of the people in the United States, umm, don’t know about the controversy, and in other countries some people are very active in talking

about the controversy. It's really hard to get information out to the United States because the companies, umm, the companies that modify food like Monsanto, modify plants, umm, have a lot of money and power specifically in the United States there, umm, people can't talk about things without consequences, people are kind of afraid to talk about them. But in other countries people are kind of upset about them, sometimes they want their foods to be labeled, they want to be able to choose whether they eat them or not, and farmers who are trying to farm non-genetically modified food want to be able to make corn without paying a company for seed if their field happens to get, umm, you know, mistakenly plant like, genetically modified corn, which can happen."

CM: "Great, thank you. I think we kind of talked about this briefly, umm, but just let me know if I've captured everything, but do you remember if there was a turning point or anything that really influenced you after hearing about genetically modified food?"

P3: "Influenced me to?"

CM: "Umm, just influenced how you think about things, and maybe, umm, behavior changes."

P3: "Yeah, I think becoming vegan was all part of that. I started paying a lot of attention in terms of my food, and around that time in my life, yeah, and of course I was afraid that genetically modified foods caused cancer and I had all of these horrible like fearful reactions to like, 'what the hell is this,' 'what the hell am I eating,' 'that's terrible,' but, umm, now I understand that it's still a food, you know, umm, it still has the genes in it but that doesn't necessarily harm humans, it actually doesn't harm humans as far as we know, umm, I just have an understanding that we don't know about mutations to the genes, and I don't like the way the companies work, so, umm, it's more of a politically based motivation, and I didn't understand that when I became vegan that it was really politically based, like now I still do, there was that moment that I didn't want to eat canned foods because I was learning about all of this stuff, I didn't understand."



## Appendix G

### Excerpt of “Kristin’s” Interview

CM: “Do you think that the average American understands what genetically modified food is?”

P4: “The average American? What do you mean by that?”

CM: “Umm, well I suppose just like.”

P4: “The general population?”

CM: “Yeah, just like do you think that they understand or are maybe aware of it?”

P4: “I’m not sure, probably not would be my guess. But food issues are becoming more of, I guess average, or they’re kind of getting into mainstream society more with people, you know, creating more mainstream media outlets about food systems, so like *Food Inc.*, umm, you know, things like that which have come out more recently that are getting kind of more into mainstream culture are becoming more aware of some things, but I don’t think that in general, no probably not.”

CM: “Okay, great, thank you. There’s been some, umm, national opinion surveys done about people’s level of understanding and awareness with genetically modified food, and Americans tend to be somewhat uninformed about GM food, why do you think that is?”

P4: “Umm, it could be because regulations are less rigid than in other countries and other countries have taken more structured approach to their policies towards genetically modified food. Our country is so big, it’s so diverse, it makes kind of any issues sort of like that more decisive and, you know, easier in a small European country for people to control things more than in a big country. I think it’s just sort of a product of our development of our culture and the way that our government has developed policies its policies that tend to lean towards industrialized agriculture and farm bills that promote corporate agriculture and creating the whole industrialized agriculture system that, you know, kind of lead to Americans being very lazy about food because food is really accessible for the most part, not to all populations, but it has made a lot of food really cheap and makes a lot more processed food, and just habits and things like that, so that sort of started with policies in the 1930’s that changed the way that we supported, instead of supporting small farmers, local food systems that went to a more corporate approach and then that, you know, leading to free trade and globalized economies and, you know, the need for more industrialized agriculture systems.”

CM: "Great."

P4: "Yeah (laugh)."

CM: "Really great. So this is my last formal question, what do you think is the best way to inform Americans about GM food?"

P4: "They can inform them, gosh I think probably media outlets that are able to make into the more mainstream, like you know the forms that they have. I think is the best way to really reach people that otherwise wouldn't even think about those issues, but maybe, you know, less documentary style and more entertainment style, media that they might watch anyway and then kind of build those issues into that entertainment, so yeah, I don't know, on a broad scale I would say that would be a good way. Maybe more pieces about it in the local news and newspapers and things like that, more of it in school for sure, definitely talking to younger populations of students about it, and of course teaching where their food comes from, and learning about genetics and how pollination works, and all of those things, and also learning about environmental and organisms and how they're all connected, and how, umm, what are the effects, and sort of the pros and cons of those, and all those different things that come up in genetically modified food."

CM: "Yeah, great, that sounds really great to me (laugh). So I just wanted to give you an opportunity, and if I missed anything about your experience or anything that's important to you that I just didn't cover in my questions that you would like to share."

P4: "I don't think so, that kind of brought out a lot of different experiences that I've had. I think definitely just the more people are involved in the process of growing food, it's the most important part of it. People make those connections with how food is grown and the difference between a fresh vegetable versus something that has been shipped or, you know, some type of storage, letting people experience things for themselves in a hands-on kind of a way, really teaching them about it, and, umm, yeah, inviting people, you know, to talk to people on all sides of the issue, to farmers to business people, you know, and hearing all different perspectives and that kind of thing is really important to issues like this, of course policy is going to be the main factor that affects it. I think it would be really important to figure out ways that people could feel like their opinions really mattered and their opinions can change, I think the biggest problem is that people feel like, you know, they may feel one way about an issue but as a single person there is no way to change it, you know, if there's a way to kind of bridge that gap for people, but that seems to be the thing, people learn about the issues but then they have to go on to things that matter in their everyday life, and it's hard to feel like their opinion really matters in the broader scale of policy level and, you know, things that happen, umm, above them, yeah, so I don't know if there's a way to bridge that gap or not."

## Appendix H

### Excerpt of “Ann’s” Interview

CM: “Why was it important for you to, I guess join that community or be part of that community?”

P5: “It’s been part of my life for a really long time. I studied sustainable agriculture as an undergrad, I grew up on a farm, sustainability and I guess environmental awareness has also been a big part of my life. I also want to add just one more thing. I also think it’s really important for people to know where their food comes from, and I think especially in the city that gets lost more often than it should. Growing up on a farm everybody knows where their food comes from, but I am constantly surprised in the city where people don’t know that potatoes grow underground, they don’t know what broccoli looks like growing, they think strawberries grow on trees, that sort of thing.”

CM: “Yeah (laugh). And how did you first become interested in genetically modified foods?”

P5: “So as an undergrad I studied sustainable agriculture, so I learned a lot about organic farming methods, umm, and then when I really got interested in it was when I started working at a soil ecology lab. So, I spent four years working at this lab where we helped people make the transition from conventional, like chemical intensive agricultures to sustainable agriculture, and so I spent most of my life like looking through the microscope and looking at bacteria and fungi and protozoa and nematodes, and all the life that’s in the soil, and it was completely amazing looking at organic soils versus like conventional golf courses, like in the organic soils it was filled with life and all those organisms are turning over nutrients and like taking care of the soil for you, whereas in the golf course ones they had constantly use fertilizers and pesticides just to keep their plants alive, and in the soil it was basically dead, like nothing was alive in it. And so that started getting me thinking like, well now that, I mean now corn, eighty percent of all corn grown in the U.S. is genetically modified, what effect does that have on the soil environment? I mean within the last ten years or thirteen years going from no genetically modified corn to eighty percent, like that can have a huge impact on the environment, but nobody is really looking at that, so that’s how I got into it.”

CM: “And how knowledgeable do you feel about genetically modified foods?”

P5: “Well, it’s hard to keep up because there are all sorts of different products in the pipeline. When I was an undergrad I was active, cause I would read about it all the time, umm, I know about the big major agricultural crops now. I guess in terms of the general public I’m probably an expert (laugh), but I always feel like there’s so much more to learn and the companies come out, they’re doing research and development all

the time, so it's hard to know, there's even databases that show, umm, have you heard of like the pharm crops, like pharmaceutical crops?"

CM: "Yes, yeah."

P5: "So, there's a database that like all the different places all over the United States where they're testing, you know, human growth hormone grown in beans or whatever, and so it just, there's so much now it's hard to keep track of."

CM: "Yeah, yes. And, umm, this is not really like a test question, it's more just, I want to give you a space in how you define genetically modified food for yourself."

P5: "Well, I mean technically it's taking genes out of one organism and putting them into another organism. Most commonly that is done with organisms like across species that would never have a chance to interact otherwise, umm, sometimes within the same plant they just, umm, you know, do some sort of deletion or change the genetic code a little bit so that it's all within the same plant, but most of the time it's across species, so that's usually what I'm talking about when I'm referring to genetically modified foods."

## Appendix I

### Excerpt of “Charlie’s” Interview

CM: “Do you think that average American understands what genetically modified food is?”

P6: “No way, absolutely not.”

CM: “And why do you think that is?”

P6: “(laugh).”

CM: “I know it’s a big question (laugh).”

P6: “Well, it seems like many Americans just don’t seem to be too concerned about anything, really. They’re just going along with the flow, and kind of in survival mode and not necessarily analyzing what’s going on around them for a variety of reasons.”

CM: “Great, thank you. So this is kind of a follow up question to that last one, but in my research thus far, I’ve come across some public opinion polls, American opinion polls, and Americans tend to be somewhat uninformed about genetically modified foods, so why do you think they’re uninformed?”

P6: “Well, I would just say, why are American so uninformed across the board, umm, television, lack of interest, and people just sort of struggling day to day to their lives and not and no one’s really thinking too much about the big picture and how all these emerging issues and emerging technologies really affect a lot, and people assume it’s the government’s responsibility to do that, and they put faith in government and sort of the corporate model that we have and assume everything is safe and good. And I would just hesitate to really put all my faith in those realms, personally.”

CM: “Sure, thank you. So what do you think is the best way to inform Americans about genetically modified foods?”

P6: “That is a real good question. I would say providing them with a pro and con set of arguments that describes the technology that describes potential benefits and potential drawbacks and then all the ethical ramifications, pro and con and on and on, so I think any one position is going to dissuade people from thinking about it, all the aspects of it, and people just need to know that the vast array of all the information that we know of the subject so they will be able to make up their own opinions.”

## Appendix J

### Excerpt of “Veronica’s” Interview

CM: “Do you remember, and I don’t know this may or may not have happened for you, but was there a point when it really impacted you?”

P7: “In terms of?”

CM: “Like when you learned about it something that kind of spoke to you that piqued your interest about it.”

P7: “Well I didn’t like that the seed could cross pollinate. That really bothered me with what happened in Mexico and corn. When I realized, okay yeah we sort of all guessed that might happen, the cross pollination the wind pollination, and so that regular seeds could become contaminated so to speak, when I realized the reality of that, that was really alarming. So that came later, you know, and I know, yeah, that’s disturbing to me, so I can say that really had an impact on me, the knowledge that there was that cross pollination. And then more recently I think the alarming aspect of all of this is the lack of diversity in seed available, and that so much of that diversity of seed is being lessened and GMO seed are, you know, are being sort of imposed on the landscape in a way that feels out of my control. And the other thing were the label laws that sort of stopped the knowledge of what has genetically modified foods in it, that was another thing that really had an impact on me, and gosh I’m trying to remember it had to be the mid 90’s that Oregon tried to have some of those laws put into place, and I remembered the business people being all up in arms, the rhetoric that was going around, you know, it was really one sided. As a consumer it wasn’t going to be to my benefit that they kept that information off the labels.”

CM: “Thank you, that’s wonderful. And how knowledgeable do you feel about genetically modified foods?”

P7: “I wish I had more knowledge, yeah I mean I’ve read my mentor Dr. Weasel’s book *Food Fray*, so I’ve read most of it, I haven’t read it all, but I’ve definitely went through the entire book, umm, but I feel I don’t know near enough. I’ve watched *Food Inc.*, you know, I’ve watched the film, is it the *Future of Foods*? I can’t remember, where they interviewed the farmer in Canada it’s the one who went through so much legal, so you know, my knowledge it’s probably I would say laymen’s knowledge, in other words I don’t know if I would scientifically be able to explain genetically modified foods to someone, but I could certainly speak to the political impact and the social impact on me as a consumer and on our farming agriculture community. I think I could speak to those. So could you repeat the question again?”

CM: “Just how knowledgeable do you feel?”

P7: "So I would myself, you know, I would say I have above average knowledge because I think I would have a lot to share with my family who have probably heard of GM foods, you know, Frankenfoods, but they may not of heard that, so I would say above average."

CM: "Okay, great, thank you. And I just want to give you a space to tell me about how you define genetically modified foods."

P7: "Oh my gosh (laugh)."

CM: "Please don't feel like it's a test question, it's just more how you think about it for yourself."

P7: "Well, genetically modified, okay so you want me to define genetically modified foods."

CM: "Yes, but please don't feel like it's a test question or anything. It's just how you define it for yourself and think about it in your terms."

P7: "Well, I think the term 'Frankenfood' is a very apt way to discuss or define genetically modified foods, in that you're splicing in aspects of, for instance a fish (laugh) or, you know, Roundup Ready, is it corn? I can't remember at this point."

CM: "Yeah."

P7: "You know you take an element that's not necessarily of a plant and you insert it into the genetic structure and you modify that structure, so then you can intellectually own that because you have created something that's not natural, and, you know, the ability to patent something that is, you can only patent things that are man made. So, I think that's driven, a lot of this is an economic thing. So the actual definition of genetically modified foods in my book is that it's a process of changing the DNA structure of a, I don't know where I would go with that. I think I would have to do a little bit more reading and brush up my memory bank here (laugh), umm, so I could go on but I think that sums it up, you know, there are lots of examples I know that I think it's the Roundup. Umm, you know, we heard about cloning. That's different than genetically modified foods, but, you know, it's similar it's all genetics. It's pretty scary. It's crazy. I mean I've heard of guns, I've seen the films where they show, you know, these very interesting processes. It's actually not that difficult. It's kind of amazing. It's more just matching until you get it to be successful, so, okay, I'm going to leave you with that (laugh)."